

State of the Reservation Report • Training Year 2012 Final

Upper Cape Water Supply Reserve
Massachusetts Army National Guard
Camp Edwards, MA

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ACKNOWLEDGEMENTS

The following programs, offices, and consulting firms provided information or assistance for sections of the Annual *State of the Reservation Report* for Training Year 2012:

- Camp Edwards Headquarters
- Camp Edwards Range Control
- Camp Edwards Ammunition Supply Point
- Impact Area Groundwater Study Program
- Installation Restoration Program
- Massachusetts Army National Guard Plans, Operations and Training Office
- Massachusetts National Guard Environmental & Readiness Center
- Northeast Regional Climate Center, Cornell University, Ithaca, New York
- United States Army Corps of Engineers
- United States Geological Survey
- Upper Cape Regional Water Supply Cooperative
- 102nd Intelligence Wing, Massachusetts Air National Guard

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ACRONYMS

AEC	Army Environmental Command
AFCEC	Air Force Civil Engineer Center
AFCEE	Air Force Center for Engineering and Environment
AFRL	Air Force Research Laboratory
AFS	Air Force Station
ANGB	Air National Guard Base
ANTST	Antenna Station
APCC	Association to Preserve Cape Cod
AR	Army Regulation
ATV	All Terrain Vehicle
BMP	Best Management Practice
BOMARC	Boeing Michigan Aeronautical Research Center
BP	Battle Position
Btu/hr	British Thermal Unit/hour
CAA	Clean Air Act
CAC	Community Advisory Council
CER	Camp Edwards Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIED	Counter Improvised Explosive Device
CMR	Code of Massachusetts Regulations
CS	Chemical Spill
DA	Department of the Army
DCR	Department of Conservation and Recreation
DFG	Department of Fish and Game
DNA	Deoxyribonucleic acid
DNT	Dinitrotoluene
DoD	Department of Defense
E&RC	Environmental & Readiness Center
EA	Environmental Assessment
EDB	Ethylene Dibromide
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMC	Environmental Management Commission
ENF	Environmental Notification Form
EO	Environmental Officer
EO	Executive Order
EOEA	Executive Office of Environmental Affairs
EOEEA	Executive Office of Energy and Environmental Affairs
EPA	Environmental Protection Agency
EPS	Environmental Performance Standard
FAA	Federal Aviation Administration
FEIR	Final Environmental Impact Report

ACRONYMS, Cont'd

FONSI	Finding of No Significant Impact
FS	Fuel Spill
GP	Gun Position
gpm	gallons per minute
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HMX	High Melting Explosive
IAGWSP	Impact Area Groundwater Study Program
ICRMP	Integrated Cultural Resources Management Plan
IED	Improvised Explosive Device
IENMP	Installation Environmental Noise Management Program
INRMP	Integrated Natural Resources Management Plan
IPMP	Integrated Pest Management Plan
IRP	Installation Restoration Program
ITAM	Integrated Training Area Management
JLUS	Joint Land Use Study
KD	Known Distance
kv	kilovolt
LCTA	Land Condition Trends Analysis
LGQ	Large Quantity Generator
LRAM	Land Rehabilitation and Maintenance
LZ	Helicopter Landing Zone
MAANG	Massachusetts Air National Guard
MAARNG	Massachusetts Army National Guard
MANG	Massachusetts National Guard
MassDEP	Massachusetts Department of Environmental Protection
MADFW	Massachusetts Division of Fisheries and Wildlife
MCP	Massachusetts Contingency Plan
MC3	Military Civilian Community Council
MEC	Munitions and Explosives of Concern
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGL	Massachusetts General Law
MHC	Massachusetts Historical Commission
MIDAS	Munitions Items Disposition Access System
MIPAG	Massachusetts Invasive Plants Advisory Group
mm	millimeter
MMR	Massachusetts Military Reservation
MMRCT	Massachusetts Military Reservation Cleanup Team
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOUT	Military Operations on Urban Terrain
MP	Mortar Position

ACRONYMS, Cont'd

MW	Megawatt
NBC	Nuclear-Biological-Chemical
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NHESP	Natural Heritage and Endangered Species Program
NPC	Notice of Project Change
OEA	Office of Economic Adjustment
OMMP	Operation, Maintenance and Monitoring Plan
OP	Observation Point
P2	Pollution Prevention
PAVE PAWS	Precision Acquisition Vehicle Entry – Phased Array Warning System
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive
REC	Record of Environmental Consideration
ROTC	Reserve Officers Training Corps
RTLA	Range and Training Land Assessment
SAC	Science Advisory Council
SAR	Small Arms Range
SARWG	Small Arms Range Working Group
SCP	Site Consolidation Plan
SDWA	Safe Drinking Water Act
SEIR	Supplemental Environmental Impact Report
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedure
SR/ES	Source Registration/Emissions Statement
SVL	Soldier Validation Lane
TASC	Training Aids Support Center
TEMTADS	Time-domain Electromagnetic Multi-sensor Towed Array Detection System
TNT	Trinitrotoluene
TSA	Training Support Area
TY	Training Year
UAS	Unmanned Aerial System
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTES	Unit Training and Equipment Storage
UTM	Ultimate Training Munition
UXO	Unexploded Ordnance

ACRONYMS, Cont'd

VCE-SME	Vehicle Crew Evaluator - Subject Matter Expert
WWTP	Wastewater Treatment Plant
XCTC	eXportable Combat Training Capability

EXECUTIVE SUMMARY

The Massachusetts National Guard (MANG) is pleased to present the 2012 State of the Reservation Report for the Upper Cape Water Supply Reserve/Camp Edwards Training Area. It has been another exciting year at Camp Edwards as there have been actions in training activities, natural resources, alternative energy, continued site and agency consolidation planning and initiatives, and a new MMR staff position for the MANG. The Massachusetts Military Reservation (MMR) continues to plan for and transform its facilities and operations into world class facilities that can be utilized not only by our Soldiers but by a host of public servants charged with our well being in our communities and country. Joint training and compatible use continues to be the focus for Camp Edwards and the rest of the MMR. The Reservation has become increasingly important as a joint training facility for Department of Defense (DoD), Department of Homeland Security (United States Coast Guard), State emergency responders, and local law enforcement. The Massachusetts Army National Guard (MAARNG) is continuing to use its training facilities to simulate life in a combat area and to train Soldiers on current and necessary tactics and techniques for survival and successful federal and state missions.

One of the critical components for the MANG at Camp Edwards is the return to live fire on its ranges for small arms training and qualification. Each Soldier is required to qualify on their personal weapon before deploying. The MAARNG has been utilizing Juliet, Kilo and Tango ranges for training Soldiers since 2008. These three ranges were set up with bullet traps for use of lead bullets and are operated in accordance with an Operation, Maintenance and Monitoring Plan (OMMP). The focus of these plans is to ensure safe operations occur while still monitoring and being protective of the environment. A refinement that occurred in TY 2012 is that the OMMPs for these three ranges were consolidated into a single document for more efficient implementation that leads to better range operations and environmental protection. Two other ranges critical and required for Soldier training and deployment have been developed, in coordination with federal and state regulators, on Camp Edwards. These ranges are using DoD's new Enhanced Performance Round that is made up of steel and copper and is considered environmentally friendly. One range is Sierra Range, which is a Modified Record of Fire Range (pop-up range) that allows Soldiers to qualify with their weapons before being deployed. The other range is India Range, which is required for Soldiers to zero (sight) their weapon before using Sierra Range to qualify. These new ranges are significant components to the vision for Camp Edwards to have Soldiers able to conduct all of their required training tasks and qualifications at their home station. Currently, Soldiers must leave Camp Edwards and travel to other training areas to conduct some of their significant training requirements. This travel time causes a substantial loss of training time and often the ranges and other assets at these sites are unavailable to MAARNG Soldiers.

The next small arms range required for Soldier training and that will aid in filling the mission for training Soldiers at Camp Edwards is Echo Range. Echo Range is a pistol qualification range and will be redeveloped to meet current pistol qualification training standards. This range, like the others, will be redeveloped to be as safe and environmentally protective as possible while still conducting the required training.

In keeping with the small arms ranges, previously described, the MANG at Camp Edwards completed the Supplemental Environmental Impact Report (SEIR), EEA 5834, August 5, 2012 for the Small Arms Range Improvement Project at Camp Edwards. The SEIR was completed in accordance with the requirements set forth by several certificates and communications with the Secretary of the Executive Office of Energy and Environmental Affairs (EOEEA) through the Massachusetts Environmental Policy Act (MEPA) office. The intent of the SEIR filing was to satisfy the Secretary's November 9, 2006 and August 10, 2007 Certificate requirements for supplemental information and authorized the MANG to present the remainder of the Small Arms Range Improvement Project for state permitting, as appropriate, through the Environmental Management Commission (EMC) in accordance with the Environmental

Performance Standards (EPSs) and, where they do not exceed MEPA threshold criteria, without the requirement for further MEPA review. The MANG will continue to work through the Small Arms Range Working Group (SARWG), US Environmental Protection Agency, the Massachusetts Department of Environmental Protection, and the EMC to develop required and necessary small arms ranges that are environmentally compatible with the Reserve/Training Area at Camp Edwards.

Two other training venues new or returning to Camp Edwards are being used and developed to meet the mission of having all required training venues at Camp Edwards. The first is referred to as the Soldier Validation Lane (SVL) or Home Station Training Lane. The SVL is similar to the eXportable Combat Training Capability (XCTC) training conducted in 2011. This training provides for mock villages, role players and emersion training for MANG and other Soldiers. This training provides for shoot, no shoot and cultural familiarity training to have Soldiers better prepared to deal with citizens of the countries in which they are deployed. The SVL is a critical tool for preparing Soldiers for deployment to Afghanistan: as they say, train as you fight to be best prepared. The SVL provides for comprehensive, mission critical crawl, walk, and run training all while still protecting the environment of the Upper Cape Water Supply Reserve and the Camp Edwards Training Area. The second venue is Lima Range, which will be used again as a 40mm grenade range. However, the range will be used for training rounds only. This range is in development in accordance with the EPSs and in cooperation with the EMC as is required.

Within the Natural Resources and Integrated Training Area Management (ITAM) realm, activities continue to focus on supporting training, management and protection of the resources on Camp Edwards. The ITAM program continues to coordinate and work with the Camp Edwards trainers and Range Control to address compatible training needs. For example, one of the requirements for the SVL is that placement of the containers be coordinated with the ITAM program to avoid unnecessary disturbance to the environment. Another focus of the program during 2012 was the continued joint effort with other federal, state and nonprofit agencies to research and conduct management for the federal candidate species known as the New England Cottontail (*Sylvilagus transitionalis*). Research is focusing on this animal's habitat and spacial needs. Management for this animal's habitat includes mechanical alteration and prescribed burning of vegetation.

Alternative energy opportunities, as envisioned by the community and the military, at Camp Edwards and the MMR have been developed and are considered a success in saving money and creating less green house gases. Current interest is in wind, solar power and the retrofitting of facilities to make them more energy efficient. There are three operational wind turbines, one in the Cantonment Area and two in the Upper Cape Water Supply Reserve or Camp Edwards Training Area close to Cape Cod Air Force Station. These turbines will help offset energy usage for groundwater cleanup energy cost associated with pumping water. Cape Cod Air Force Station will be constructing two wind turbines, during spring/summer 2013, to offset energy cost and to help reduce fossil fuel use. The former Otis Air Force Base landfill has been determined to be an excellent site for solar power that could produce up to 8.6 megawatts of electricity. The project will be awarded and begin in 2013. This project will in turn help the MMR become more energy independent and again help in reducing fossil fuel use. Conservation measures and building retrofitting are also being implemented to reduce cost and energy consumption at the MMR. For example, the barracks at Camp Edwards have had windows and heating systems upgraded. Windows obviously provide better insulation value and the heating systems are state of the art centrally controlled systems that will reduce energy consumption and costs.

An MMR initiative, which includes Camp Edwards, is the proposal for a joint installation through a well-developed joint strategic plan that synchronizes missions and efficiencies on the MMR. Each major tenant on the MMR will provide their own plan which will then be consolidated and coordinated to develop the joint strategic plan for the MMR. Camp Edwards will contribute by providing an update to its 2005 Site Consolidation Plan that will include the Reserve/Training Area. Concurrently, DoD's Office

of Economic Adjustment has funded the MANG to update its Joint Land Use Study (JLUS). This study will be appropriately updated as missions, especially the 102nd Intelligence Wing of the Air National Guard, have changed significantly enough that the JLUS warranted an update. The Cape Cod Commission through the Military Civilian Community Council (MC3) leads the JLUS effort with support and participation through the surrounding towns and the MANG. Several of the MMR military commands are considering the basing of additional missions at MMR as well as looking at the efficiencies that might be gained through consolidation and cost-sharing of some base operating support expenses. These and other initiatives have to be properly coordinated to ensure that expansion does not over stress base infrastructure, utility capacity and other operational needs.

Along with the opportunity to pursue strategic mission plans for the MMR comes the responsibility to do so in a coordinated manner that is efficient, effective, supportive of national security objectives, beneficial to the Cape Cod economy, and, above all, respectful of the fragile environment of the Upper Cape. To ensure that this endeavor is carried out in an organized and cohesive manner, the Adjutant General has established the position of Executive Director, MMR to oversee the effort. This position is vital to ensuring the successful transition of the MMR as a true joint installation.

Since 2001, the Environmental & Readiness Center (E&RC) has continued to be the Adjutant General's environmental management element at Camp Edwards and is charged with the responsibility for providing coordination and support for: military training; military readiness; environmental clean-up information; installation long-range planning; communications between the community and MMR organizations and programs; and applicable decision-making processes in full partnership with the other commands and the community. The E&RC is responsible for ensuring that the commitments of the Department of the Army, National Guard Bureau and the MANG to provide military personnel with realistic training while simultaneously protecting the natural and cultural resources of Camp Edwards are met.

Questions on the Training Year 2012 State of the Reservation Report should be addressed to: Mr. William Sullivan, Operations Officer, MMR Environmental & Readiness Center, Building 1203, West Inner Road, Camp Edwards, MA, 02542, (508) 968-5147, William.G.Sullivan.nfg@mail.mil or Mr. Mark Begley, Environmental Officer, Environmental Management Commission, Building 1204, West Inner Road, Camp Edwards, MA 02542, (508) 968-5127, Mark.Begley@state.ma.us. For more information, please access our web site at www.eandrc.org. Please take the opportunity to provide us feedback on this important document. Regulatory and community feedback help ensure the future viability and environmental integrity of this piece of land we refer to as Camp Edwards and the MMR.

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SECTION 1 INTRODUCTION

1.0 INTRODUCTION

The Massachusetts National Guard (MANG) is pleased to present the Training Year 2012 Annual State of the Reservation Report (hereafter “Annual Report”). The Annual Report is based on the military Training Year (TY) which, like the federal fiscal year, runs from October 1 through September 30.

1.1 ANNUAL REPORT REQUIREMENT

An Annual Report is required by: 1) a Certificate issued on July 16, 2001 by the Massachusetts Executive Office of Environmental Affairs (EOEA) on the Final Massachusetts Military Reservation (MMR) Master Plan/Environmental Impact Report; 2) a Memorandum of Agreement (MOA) signed on October 4, 2001 between the Commonwealth of Massachusetts, the United States Army, and the National Guard Bureau (NGB); and 3) by Chapter 47 of the Acts of 2002, enacted by the Commonwealth of Massachusetts on March 5, 2002.

The July 16, 2001 Certificate requires the Annual Report to include:

- Reporting on levels of training and range area usage (including usage levels for civilian activities)
- Describing the range of resource management activities
- Reporting on environmental indicators for training activities (including a separate section for each of the eighteen (now nineteen) environmental performance standards for the Camp Edwards Training Area), with environmental performance quantified or mapped whenever possible
- Coordination with other activities and projects (summarize status of the regional water supply and other projects undergoing separate Massachusetts Environmental Policy Act [MEPA] review, and or remediation program activities within the Installation Restoration Program [IRP] and Impact Area Groundwater Study Program [IAGWSP])
- Environmental Notification Form (ENF) filings for proposed new National Guard projects within MMR, when required
- Mitigation status tracking for all MEPA projects

The Certificate states that in each Annual Report major categories of information be reported for the past five years whenever such data is available so that information can be best understood not for individual years, but rather in the context of long-term trends. However, where available, data is included in this report back through TY 2002, the year the first Annual Report was published.

The October 4, 2001 MOA and Chapter 47 of the Acts of 2002 require the Annual Report to include:

- The nature and extent of military training and other activities
- All resource management activities and projects

- The status of compliance with applicable federal and state environmental laws and regulations and the Environmental Performance Standards (EPSs) (Appendix A)
- Long-term trends in the major areas of resource management and activities

1.2 ANNUAL REPORT STRUCTURE

This Annual Report is for TY 2012, which runs from October 1, 2011 through September 30, 2012. Its primary focus is an assessment of the Massachusetts Army National Guard's (MAARNG) environmental programs as required by the July 2001 EOECA Certificate, the October 2001 MOA, and Chapter 47 of the Acts of 2002. Although categories of major information are required to be reported only for the past five years, this Annual Report includes data back through TY 2002, the year the first Annual Report was published.

Section 2, Small Arms Range Update, provides an update on the return to firing lead ammunition at the Small Arms Ranges at Camp Edwards and the projects and activities associated with that initiative, thus meeting the requirement of a November 9, 2006 EOECA Certificate to include an annual update on Small Arms Range activities as part of the annual State of the Reservation Report.

Section 3, Environmental Management Programs and Compliance with Environmental Performance Standards, focuses on environmental management programs operated by the MAARNG in the Reserve and program compliance with the EPSs for the training year.

Section 4, Military Training Activities, provides information on military training that occurred in the Reserve during TY 2012. Data is provided on the levels of training in the various training areas in the Reserve and range usage, as well as at the various training support area facilities in the Cantonment Area on Camp Edwards. Information is included in this section on the use of simulated munitions and pyrotechnics in the Reserve, training activities approved by the Environmental Management Commission (EMC) and the U.S. Environmental Protection Agency (EPA) Region 1 in recent years. Information also is provided on Soldier Validation Lane (SVL) training, which was approved by federal and state regulatory agencies in TY 2011.

Section 5, Remediation Program Activities, provides a summary of remediation activities undertaken in the Reserve during the training year by the IRP and the IAGWSP programs, as required by the July 2001 EOECA Certificate.

Section 6, Miscellaneous Military and Civilian Activities and Environmental Program Priorities, provides information on major activities undertaken by the MAARNG during TY 2012 that may not be directly related to a MAARNG environmental management program or specific EPSs for the Reserve. It also includes information on non-military activities proposed for Camp Edwards or Otis Air National Guard Base (ANGB) properties. Finally, it reviews the status of achieving the MAARNG environmental program priorities for the Reserve for TY 2012 as presented in the TY 2011 Annual Report, and identifies the environmental program priorities of the MAARNG's environmental programs for the Reserve for TY 2013.

Section 7, References Cited, contains a list of references.

1.3 MASSACHUSETTS MILITARY RESERVATION STRUCTURE

The MMR is a multi-service military installation and is home to the Massachusetts Air National Guard's (MAANG) Otis ANGB, the United States Coast Guard's (USCG) Air Station Cape Cod, the Department of Veterans Affairs Cemetery, the U.S. Air Force's Cape Cod Air Force Station, and the MAARNG's Camp Edwards. The MMR is located in the upper western portion of Cape Cod, immediately south of the Cape Cod Canal in Barnstable County, Massachusetts. It includes parts of the towns of Bourne, Mashpee and Sandwich, and abuts the Town of Falmouth. The MMR covers nearly 21,000 acres – approximately 30 square miles (Figure 1-1).

The MANG's components of the MMR comprise two primary land use zones. The Upper Cape Water Supply Reserve (hereinafter "Reserve") comprises approximately 14,400 acres on the northern portion of the MMR; within which are land owned by the Commonwealth and a considerable portion of the Camp Edwards field training areas. The remaining military-controlled area of the MMR lies in the southern portion, or Cantonment Area, and comprises approximately 5,000 acres.

The MAARNG and MAANG are part of the Commonwealth of Massachusetts Military Division. However, federal law largely dictates their activities, make-up, training, and functions. For example, most of the day-to-day activities conducted at the MMR by the National Guard, including annual and weekend training, are federal military activities funded by the federal government. In conducting federal military activities, the National Guard is required by federal law to follow federal Department of Defense (DoD) regulations, Army and Air Force guidance and regulations, and applicable federal and state laws and regulations.

There are three major facilities in the northern portion of the MMR that are not on land under the operational control of the MANG. Cape Cod Air Force Station, which includes the PAVE PAWS ballistic missile early warning radar system, is located on an 87-acre parcel of land on the northwest corner of the Reserve. The USCG's Antenna Station (ANTST) Boston is located on a 542-acre parcel along the northeastern side of the Reserve. A Barnstable County Correctional Facility that opened in 2004 is located on a 29-acre parcel of land just north of Connery Avenue, just outside the southern edge of the Reserve. The locations of these facilities are shown in Figure 1-1. Since these facilities are located on land not under the control of the Massachusetts National Guard, and since the EPSs established through the MMR Master Plan/Environmental Impact Report process do not apply to these organizations and facilities, information concerning activities at these facilities is not included in the Annual Report. Questions pertaining to activities at Cape Cod Air Force Station and the Coast Guard Antennae Station should be addressed to the persons listed in the list of contacts in Appendix B of this report. Requests for information about the Barnstable County Correctional Facility should be made to the Sheriff's office at (508) 563-4300.

The Commonwealth of Massachusetts has issued three utility easements on its state-owned property in the Reserve: an electrical power line easement (NStar) (approximately 64 miles), a natural gas pipeline easement (National Grid, previously Keyspan), and a natural gas pipeline easement (Algonquin - that partially overlays the National Grid easement) (combined total of approximately 14 miles). Additionally, the U.S. Army has issued a lease to the Upper Cape Regional Water Supply Cooperative for its facilities in the Reserve. The locations of the utility line routes are shown in Figure 1-2.

Figure 1-1 Map of the Reserve

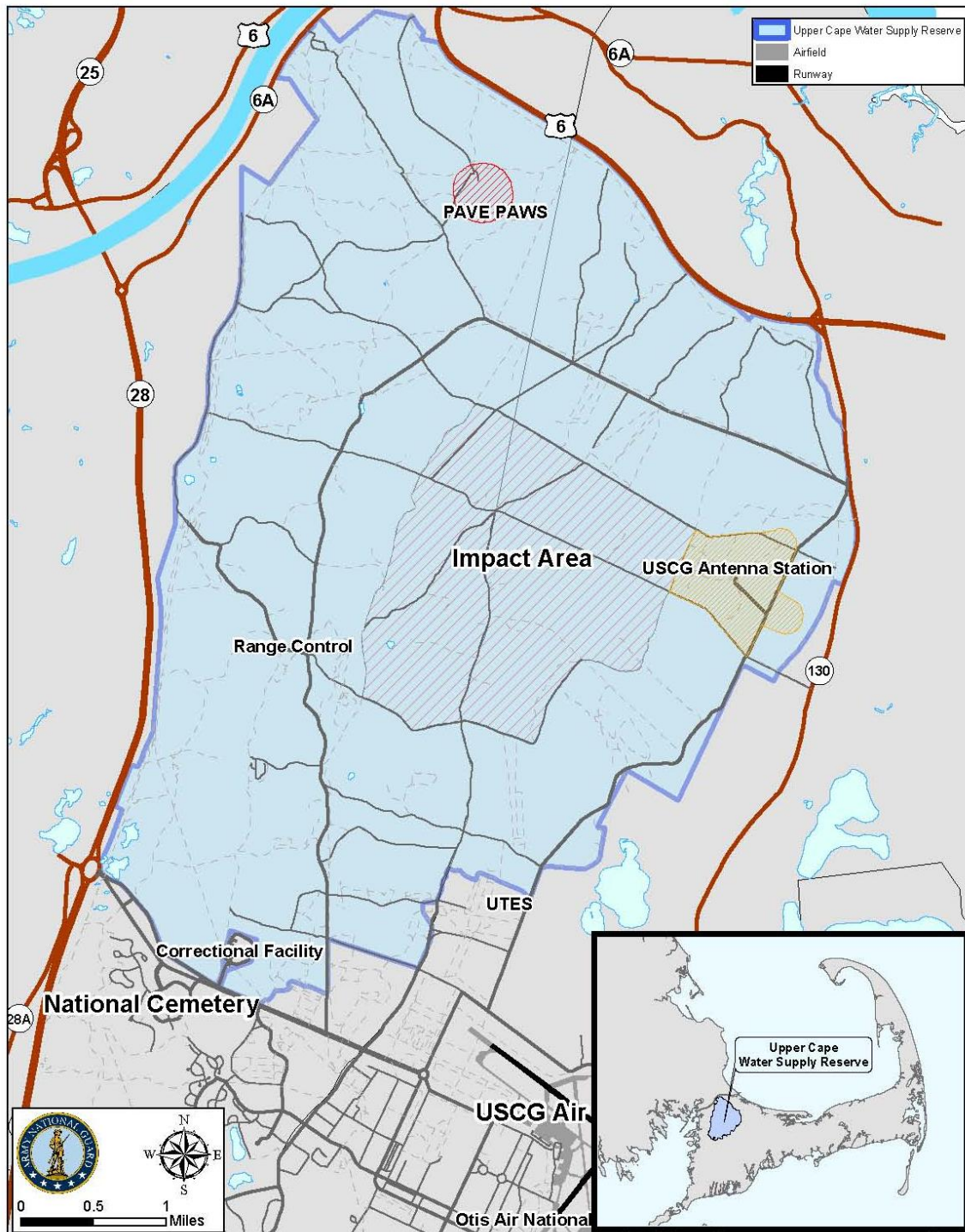
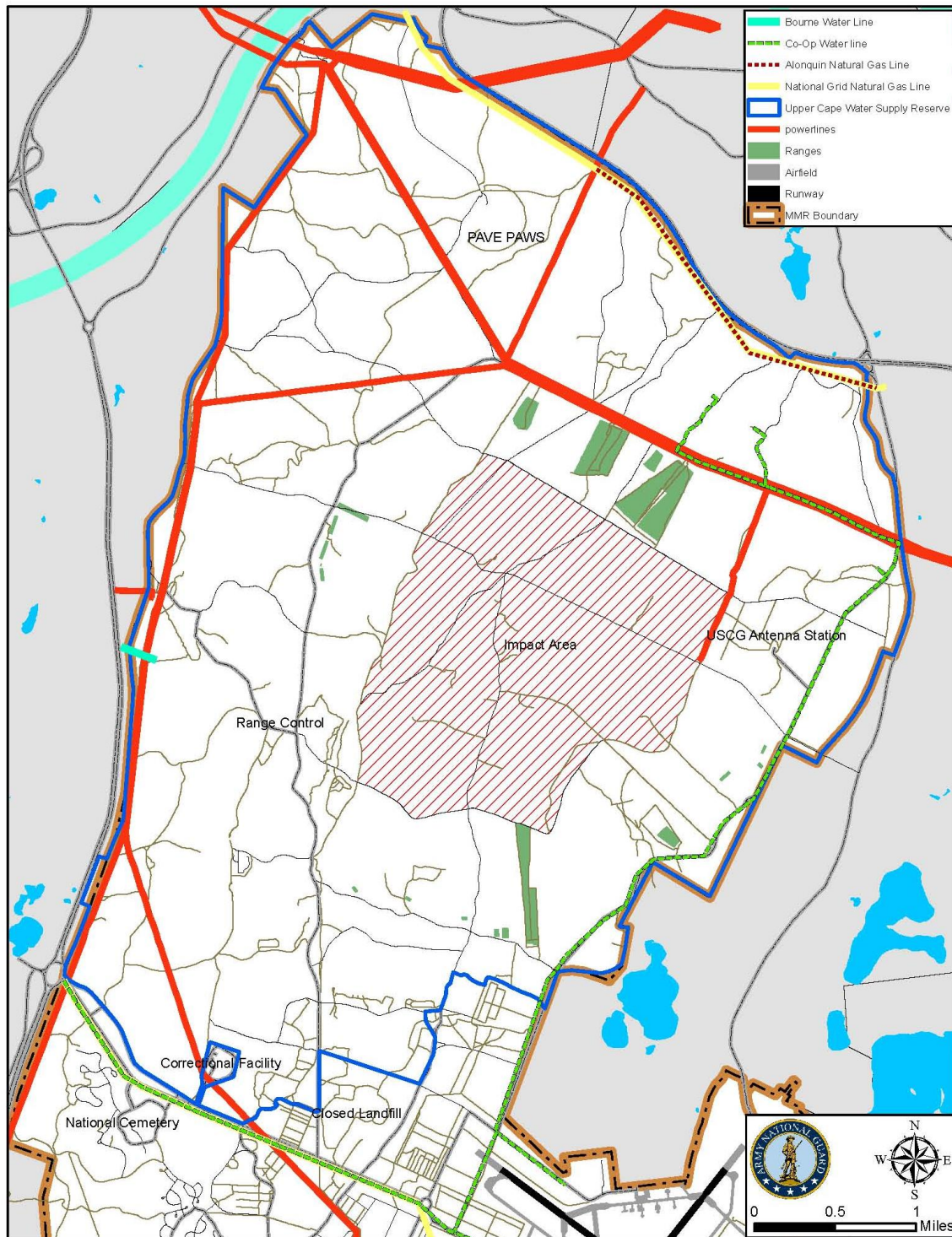


Figure 1-2 Utility Easements and Leases



1.4 ENVIRONMENTAL MANAGEMENT STRUCTURE

1.4.1 Environmental Management Commission

The MOA and Chapter 47 of the Acts of 2002 established the EMC, consisting of the Commissioner of the Department of Fish and Game (DFG), the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP), and the Commissioner of the Department of Conservation and Recreation (DCR). The EMC oversees compliance with and enforcement of the EPSs in the Reserve, coordinates the actions of environmental agencies of the Commonwealth in the enforcement of environmental laws and regulations in the Reserve, as appropriate, and facilitates an open and public review of all activities in the Reserve. The legislation also states that the environmental agencies on the EMC retain all their respective, independent enforcement authority.

1.4.2 Community Advisory and Science Advisory Councils

The MOA and Chapter 47 of the Acts of 2002 also directed that the EMC be assisted by two advisory councils. The Community Advisory Council (CAC), consisting of 15 members, assists the EMC by providing advice on issues related to the protection of the water supply and wildlife habitat within the Reserve. The Science Advisory Council (SAC), consisting of up to nine members, assists the EMC by providing scientific and technical advice relating to the protection of the drinking water supply and wildlife habitat within the Reserve.

1.4.3 Environmental Officer

The MOA and Chapter 47 of the Acts of 2002 also established an Environmental Officer (EO) for the MMR. Mr. Mark Begley, the current EO, was appointed by the EMC in December 2002. In this capacity, he provides monitoring of military and civilian activities on and uses of the Reserve and the impact of those activities and uses on the water supply and wildlife habitats. Working directly for the EMC, Mr. Begley has unrestricted access to all data and information from the various environmental and management programs. He has full access to all points in the Reserve and conducts inspections at any time in order to monitor, oversee, evaluate, and report to the EMC on the environmental impact of military training and other activities. His on-site monitoring occurs prior to, during and immediately following training and other activities. Mr. Begley's monitoring activities include but are not limited to: training sites, pollution prevention and habitat protection activities for both military and contractors in the Reserve, as well as coordinating with and consulting with the Massachusetts National Guard Environmental & Readiness Center (E&RC) on various projects, initiatives and issues.

Mr. Begley is located at the MMR and acts as a liaison between the EMC, SAC, CAC, military, general public, and various state agencies. Mr. Begley identifies and monitors ongoing issues regarding training procedures and the environment and keeps the EMC, SAC and CAC apprised of the progress of these issues in addition to bringing issues to the E&RC for resolution. He also participates in community outreach activities with the E&RC and facilitates the EMC, SAC and CAC public meetings under the legislation.

1.4.4 Meetings During TY 2012

Table 1-1 lists the dates of EMC, SAC and CAC meetings during TY 2012. At these meetings, the MAARNG presented briefings and provided information to the EMC, SAC and CAC on a variety of current or planned activities during TY 2012 to include: updates on Tango, Juliet and Kilo ranges; STAPP

system covers; Sierra and India ranges update; copper ammunition; Soldier Validation Lane training; lead ammunition pilot period extension request/approval; Air Force Civil Engineer Center (AFCEC) turbine project; natural and cultural resources management program; community involvement; pyrotechnics (M116A1 Hand Grenade Simulator); Camp Edwards Site Consolidation Plan; Joint Land Use Study; NStar projects in the Reserve; EPA Region 1 and EMC Notices of Violation; ten-year review round-table discussion of Chapter 47 of the Acts of 2002; new MMR Executive Director position responsibilities; proposed use of M781 40mm (Grenade) Training Round on Lima Range; Supplemental Environmental Impact Report; and future planning and training initiatives.

TABLE 1-1 MEETINGS DURING TY 2012		
EMC	CAC	SAC
December 5, 2011	November 17, 2011	November 2, 2011
-----	March 29, 2012	September 13, 2012
-----	September 27, 2012	-----

1.5 HISTORY OF STATE ENVIRONMENTAL REVIEWS

The MAARNG initially proposed modernization projects at Camp Edwards back in the mid-1980s. This led to a series of environmental submissions and reviews in the ensuing years as changes were made and additional projects and activities were proposed. These projects and activities led to a series of environmental Certificates issued by the Commonwealth of Massachusetts on various initiatives to resume weapons firing and particular training activities at Camp Edwards. This history can be found on the Publications page of the E&RC's website at:

<http://states.ng.mil/sites/ma/resources/erc/publications/mmr-mp-state-environmental-reviews.pdf>

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SECTION 2 SMALL ARMS RANGE UPDATE

2.0 INTRODUCTION

This section of the Annual Report provides an update on activities associated with returning to firing lead ammunition at the small arms ranges on Camp Edwards to meet the requirement established in the November 9, 2006 Certificate issued by EOEa that approved the return to firing lead ammunition on Tango Range and its August 22, 2007 Certificate on Juliet and Kilo ranges. The locations of Tango, Juliet and Kilo ranges are shown in Figure 2-1. Information on the types and amounts of lead ammunition fired on these ranges during TY 2012 is provided in Section 4 of this report.

This section also includes information on Camp Edwards' request to EPA Region 1 and the EMC during TY 2012 to return to live firing on Sierra and India ranges using copper ammunition. The locations of Sierra and India ranges are also shown in Figure 2-1. Information on the amount of ammunition fired on these ranges during TY 2012 is provided in Section 4 of this report.

Information is also provided in this section for October and November 2012 (the first two months of TY 2013) on these ranges as the EMC approval letters for the pilot programs on Tango, Juliet and Kilo ranges require the MAARNG to make efforts to include information in the Annual Report of any timely or relevant information from October and November before finalizing the Annual Report.

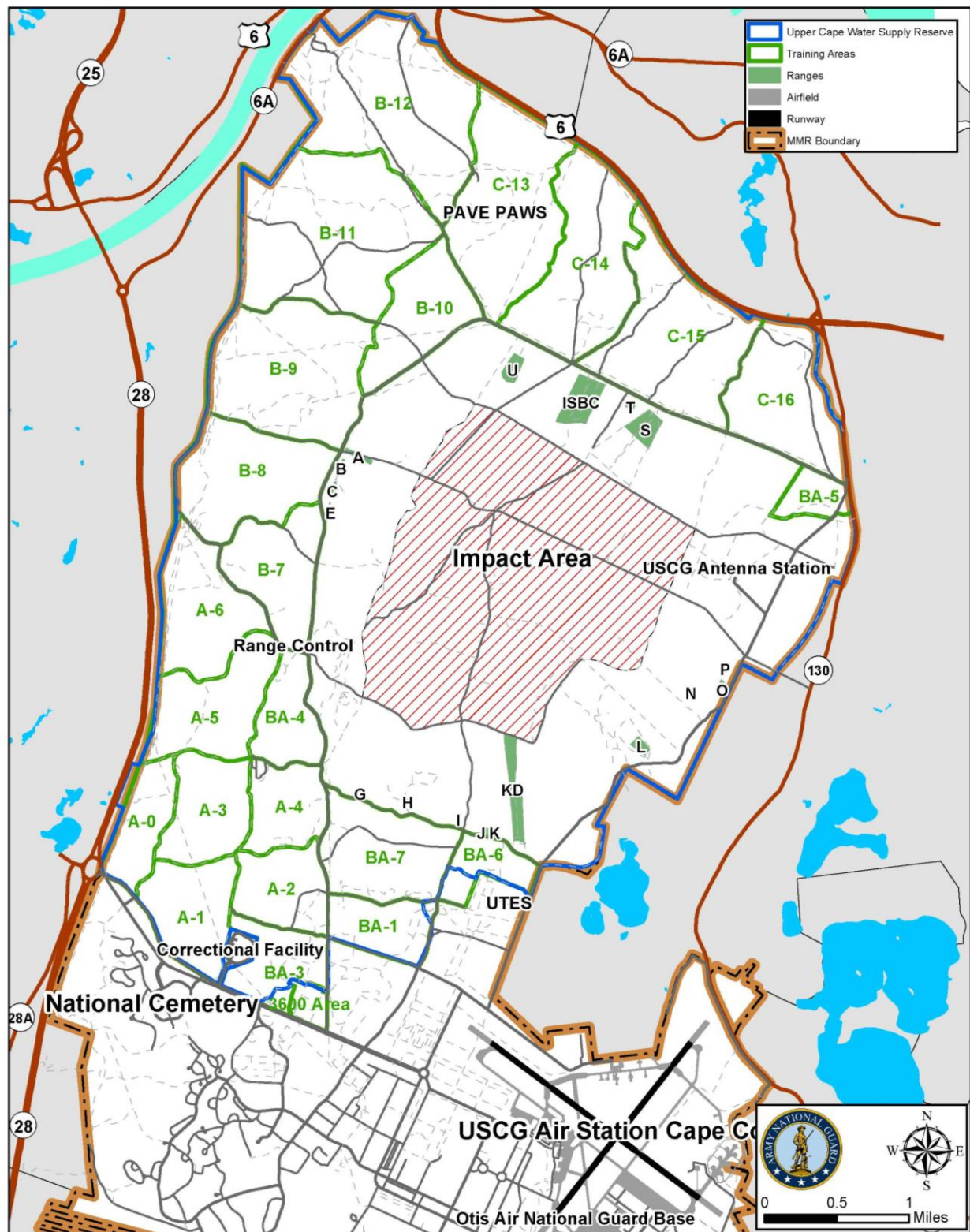
2.1 SMALL ARMS RANGE WORKING GROUP

An interagency Small Arms Range Working Group (SARWG) was established to discuss best management practices, detailed range design, pollution prevention plans, community involvement opportunities, and the investigation and remediation of specific small arms ranges. The SARWG includes representatives from MassDEP, EPA Region 1, the EMC, the Massachusetts National Guard, the E&RC, and the Army Environmental Command (AEC). The group met once during TY 2012, on February 2, 2012, although there were numerous interactions between group members by email, telephone, or in-person throughout the year.

2.2 TANGO, JULIET AND KILO RANGES – LEAD AMMUNITION

Lead ammunition firing on Tango, Juliet and Kilo ranges continued throughout TY 2012 under a pilot program approved by both EPA Region 1 and the EMC. The pilot program for Tango Range was initially approved in July 2007, while the pilot program for Juliet and Kilo ranges was initially approved in January 2009. Both EPA Region 1 and the EMC extended the pilot program period on these ranges, which include provisions for STAPP bullet capture systems, until December 31, 2012. Camp Edwards asked the EMC to approve a one-year extension of the pilot period (through December 31, 2013) at its meeting on December 11, 2012, which the EMC approved. Camp Edwards submitted a letter to EPA Region 1 on December 12, 2012 requesting it also approve a one-year extension through December 31, 2013. EPA Region 1 issued a letter on December 18, 2012 approving the one-year extension.

Figure 2-1 Camp Edwards Training Areas and Ranges



2.2.1 Range Use

Information on the types and amounts of lead ammunition fired on these ranges during TY 2012, and since firing of lead firing resumed at these ranges, is provided in Section 4 of this report.

2.2.2 Range Maintenance

Inspections of the Tango, Juliet and Kilo ranges were conducted by Camp Edwards personnel during TY 2012 in accordance with the provisions of the Operation, Maintenance and Monitoring Plans (OMMPs). The EMC and EPA Region 1 participated in numerous visits and inspections of the Reserve in TY 2012. The Chief Executive Officer of the company that builds the STAPP system conducted a site visit on November 7, 2011 to inspect the three systems.

Maintenance activities conducted during TY 2012 included: placing covers on the STAPP systems on Juliet and Kilo ranges on October 4-5, 2011 (a cover was placed on Tango Range on September 15, 2011); toe box cover repair on Juliet Range in November/December 2011; removing tarps and painting new overshot limit lines on Juliet and Kilo ranges in January 2012; removing the overshot barrier (with EMC approval) from Tango Range in April 2012; replacing sandbags, target frames, rebuilding firing line and pistol stands, spreading loam, and then hydroseeding Tango Range in May 2012; replacing all sandbags on Kilo and Juliet ranges in May 2012; repairing erosion on the back of the berm on Tango Range in August 2012; and spreading loam and hydroseeding Tango Range in August 2012. A list of maintenance activities conducted throughout the year, sequenced by date, is provided in Appendix C.

2.2.3 Range Sampling

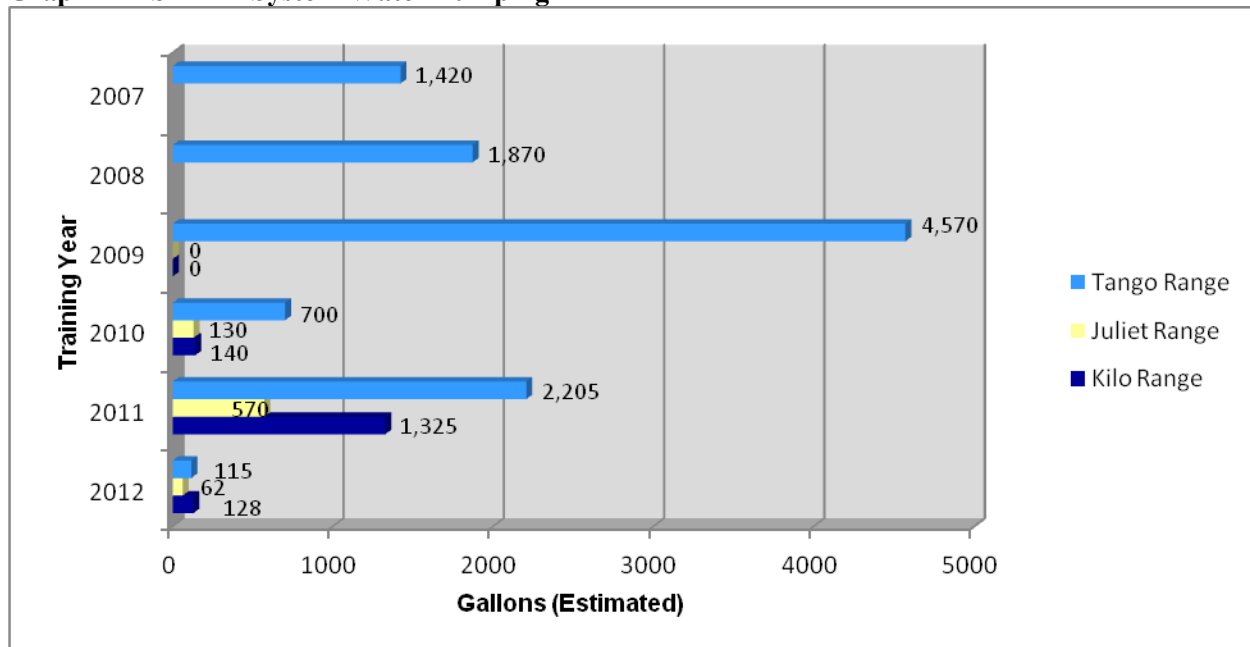
Camp Edwards submitted the results, with accompanying analysis, of soil, pore water and groundwater sampling conducted at Tango, Juliet and Kilo ranges during the May – October 2011 timeframe to EPA Region 1 and the EMC on December 15, 2011. On January 31, 2012, EPA Region 1 submitted comments to Camp Edwards on the report which were responded to by Camp Edwards on March 26, 2012. Results from sampling conducted in September and November 2012 were provided to EPA Region 1 and the EMC in early December 2012. As the report for the September and November 2012 sampling indicates, action levels for antimony in pore water samples were exceeded in lysimeters at Juliet and Kilo ranges and, as a result, further investigation of the causes of the elevated antimony concentrations is currently underway. Copies of the sampling results with accompanying analyses are provided in Appendix C.

2.2.4 STAPP System Pumping

A total of 305 gallons (estimated) of water were pumped from the STAPP systems on the three ranges during TY 2012: 115 at Tango; 62 at Juliet; and 128 at Kilo. The water is disposed of through licensed disposal firms (e.g., Clean Harbors) as a non-regulated material (water from bullet-catching system).

Graph 2-1 reflects the amount of water pumped from the STAPP systems each training year since they were installed. The decrease in water pumped in TY 2012 is primarily due to the placing of tarps over the systems which preclude infiltration of rain water. Other reasons include the development of a new Standard Operating Procedure for the STAPPs, more detailed inspections of the STAPP systems, and tighter quality control oversight procedures.

Graph 2-1 STAPP System Water Pumping



Notes:

1. Firing of lead ammunition at Tango Range commenced in March 2007.
2. A new cover was installed on the STAPP on Tango Range in July 2009 because of problems with sealing of seams on the original cover; but all of the water pumped in TY 2009 was pumped before the new cover was installed.
3. Firing of lead ammunition at Kilo Range commenced in March 2009.
4. Firing of lead ammunition at Juliet Range commenced August 2009.
5. Gallons pumped are estimated figures based on measurements of water in containment areas by dip stick. Water from multiple systems can be accumulated in the same disposal drum.

EPA Region 1 issued a letter to Camp Edwards on November 7, 2011 for failure to follow the provisions of the approved OMMP plans in not timely disposing of water that accumulated in the STAPP systems on Tango, Juliet and Kilo ranges above established limits within seventy-two hours, and for not notifying EPA Region 1 within twenty-four hours that it might not be able to do so.

As a result of this procedural violation, and after extensive consultations, Camp Edwards was fined \$27,500 in August 2012 and also agreed to conduct a Supplemental Environmental Project. The project involves removing 14 acres of existing impervious surfaces in the grasslands area of the Cantonment Area, most of it located on Otis ANGB. The project must be completed by August 5, 2013. An update on the project will be provided in the TY 2013 Annual Report.

The EMC issued a Notice of Violation letter to Camp Edwards on November 7, 2011 informing it that it had not complied with the Small Arms Range EPS (EPS 19) in failing to remove liquid from the STAPP bullet capture systems on Tango, Juliet and Kilo ranges on multiple occasions in TY 2011 within the time period established in the OMMP plans. Camp Edwards submitted a Response Packet to the EMC in early December 2011 (see first entry in Table 3-9 for additional information).

2.3 SIERRA AND INDIA RANGES - COPPER AMMUNITION

The MAARNG has been working for the past few years to find environmentally acceptable methods to allow the resumption of firing ammunition at Sierra Range. This range is critical in training Massachusetts National Guard soldiers in required combat skills and was the next range at which the MAARNG would like to resume firing lead or approved alternate ammunition. Tango, Juliet and Kilo ranges are used by soldiers for weapons familiarization training. They have fixed targets at fixed distances and thus were easily adaptable to building STAPP bullet capture systems on dirt berms immediately behind the targets. Sierra Range is used to qualify soldiers in firing their weapons. This range has pop-up targets located at various distances in each firing lane and thus STAPP systems did not appear to be practical.

Camp Edwards sent a letter to the EMC on October 11, 2011 requesting to return to live fire on Sierra Range using the M885A1, 5.56mm copper ammunition round, as well as using copper ammunition on Tango Range. The SAC was briefed at its November 2, 2011 meeting, at which all members present voted in favor of the proposal. The proposal was briefed to the CAC at its November 17, 2011 meeting, at which all CAC members present voted in favor. The EMC was briefed at its December 5, 2011 meeting, and voted in favor of a two-year trial period. On June 1, 2012, Mr. Mark Begley, the EMC's Environmental Officer, emailed Camp Edwards indicating firing of copper ammunition in June 2012 at Sierra Range was approved while official documents were finalized and issued.

Camp Edwards sent a letter to the EMC on June 19, 2012 requesting its approval of the Sierra Range Standard Operating Procedures and Range Management Plan submitted with the request letter. On June 29, 2012, the EMC issued a letter conditionally approving the Sierra Range Standard Operating Procedure and Range Management Plan for two years.

Camp Edwards also sent a letter to EPA Region 1 on October 11, 2011 requesting to return to live fire on Sierra Range using the M885A1, 5.56mm copper ammunition round, as well as using copper ammunition on Tango Range. On January 8, 2012, EPA Region 1 forwarded a letter to Camp Edwards indicating that it was not in the position to approve a particular ammunition for use at Camp Edwards and that, based on information provided, the proposed copper ammunition did not appear to violate the terms of its Administrative Order #2, which prohibited the firing of lead ammunition.

EPA Region 1's letter also indicated that it was reviewing the November 2011 Draft Sierra Range Soil and Groundwater Investigation Report and that firing copper ammunition at Sierra Range was prohibited until such time as it determined that the soil and groundwater at Sierra Range have been adequately characterized, and that no further investigations or cleanup at Sierra Range was deemed necessary.

On April 3, 2012, EPA Region 1 sent a letter to Camp Edwards indicating that it had finished its review of the Draft Sierra Range Soil and Groundwater Investigation Report and, based on its review, had determined that further investigation and cleanup was not necessary at Sierra Range at this time. It further indicated that final cleanup plans for Sierra Range (and Tango) would be formally documented in the near future in a Decision Document that would be subject to a public comment period.

Camp Edwards submitted a Request for Advisory Opinion to the MEPA office on November 18, 2011 for using copper ammunition on Sierra and Tango ranges. In the letter, Camp Edwards requested that MEPA determine that the proposed use of copper ammunition be determined as insignificant in accordance with the provisions that the proposal did not meet or exceed the applicable regulatory threshold criteria. After receiving and reviewing comments from the EMC (December 12, 2011) and MassDEP (December 13, 2011), EOEEA issued a letter on December 16, 2011 stating that the proposed

use of copper bullet ammunition at Sierra and Tango ranges did not require a Notice of Project Change and that the MAARNG could proceed with the EMC review and approval process for the proposed action.

To support firing on Sierra Range, an earthen backstop berm was constructed behind the 300-meter target line to intercept projectiles along their anticipated trajectories and contain projectiles within the impact media on the front face of the berm for future recovery. Auxiliary earthen backstop berms were added behind selected stationary infantry target emplacements at 50 meters and 100 meters to prevent range floor strikes, minimize unpredictable projectile ricochet, and contain projectiles for future recovery. Additionally, the ninety stationary infantry target emplacement berms were retrofitted with the same impact media as the backstop berms to also prevent range floor strikes, minimize unpredictable projectile ricochet and contain projectiles for future recovery.

On May 9, 2012, Camp Edwards sent letters to the EMC and EPA Region 1 requesting approval to return to live fire on India Range with copper ammunition rather than Tango Range. In these letters, Camp Edwards explained that it had discovered that the new copper ammunition round had a wider Safety Zone Distance requirement than lead ammunition, and that this wider safety zone precluded firing copper ammunition at Tango Range and the adjoining Sierra Range simultaneously. Additionally, Camp Edwards indicated that a lot of time, effort and funding had been expended on constructing the STAPP system on Tango Range and that it felt it was not appropriate to demolish the system on Tango Range after the considerable financial and manpower investment in it.

Soldiers use India Range, which has 20 lanes, to mechanically zero their assigned weapons prior to moving to Sierra Range to qualify.

The EMC issued a letter on June 8, 2012 approving the design and construction plans to use copper ammunition on India Range subject to several conditions.

EPA Region 1 issued a letter to Camp Edwards on May 15, 2012 indicating that it had reviewed the Draft India Range Tungsten Investigation and Soil Removal Project Note submitted by the Impact Area Groundwater Study Program (IAGWSP) and, based on the information reviewed thus far, it did not believe that the copper ammunition firing proposed by Camp Edwards for India Range would interfere with completing the investigations for all of the Small Arms Ranges and issuing a final cleanup decision. Therefore, it approved Camp Edwards proceeding with its plans for firing lead ammunition on India Range.

A backstop berm was constructed at India Range to maximize the recovery of rounds fired into the berm. The berm is 16 feet high and approximately 40 feet wide at its base, with a slope that runs the length of the range.

Camp Edwards submitted a letter to the EMC on August 15, 2012 forwarding the India Range Standard Operating Procedure (SOP) and Range Management Plan and requesting EMC approval of them. Camp Edwards received an email from the EMC on August 28, 2012 indicating it approved the plans and to treat the email as its approval pending issuance of a formal approval letter.

Lysimeters were installed on the range floors at Sierra and India ranges to monitor concentrations of range-related metals in pore water. Each lysimeter is two feet below the ground surface and will intercept the rainwater as it makes its way to the groundwater, thereby providing an early indication if metals are likely to impact the groundwater. These lysimeters will be monitored annually starting in September 2012 as part of the sampling program specified in the Standard Operating Procedures for these ranges.

Firing of copper ammunition commenced at Sierra Range on July 8, 2012 and at India Range on September 15, 2012.

Photograph 2-1a Soldiers firing copper ammunition on Sierra Range.



Credit: MANG Environmental & Readiness Center

Photograph 2-2 Signage posted on India Range stating only Copper Ammunition should be fired.



Credit: MANG Environmental & Readiness Center

Copies of the correspondence associated with the request and approval to use copper ammunition on Sierra and India ranges are available on the Publications page of the E&RC website.

2.4 LIMA RANGE – M781 40MM PRACTICE ROUND

Camp Edwards submitted a letter to EPA Region 1 on September 7, 2012 regarding its proposed use of the M781 40mm Training Round on Lima Range and requesting that EPA review this action under the provisions of Administrative Order #2 that it issued in February 1997. The request letter included information describing the munition and its training use, as well as a description of the constituents of the round. The M781 40mm round, a practice grenade, has a lead-free projectile composed of a hollow plastic “windshield” filled with Day-Glo-Orange marking powder.

EPA Region 1 sent a letter to Camp Edwards on October 10, 2012 indicating its proposed agreement to modify Administrative Order #2 to allow use of the M781 40mm Training Round, with its proposal subject to a fourteen-day public comment period starting on October 12, 2012 and ending on October 26, 2012. No comments were received during the public comment period and EPA Region 1 issued a letter on November 19, 2012 modifying Administrative Order #2 to allow use of the M781 40mm Training Round on Lima Range. The approval is conditioned upon Camp Edwards complying with all conditions established by the EMC and conducting training activities in a manner that does not interfere with, or slow down, the schedule for completing the investigation and cleanup required under the Administrative Orders.

The SAC was briefed on this request at its September 13, 2012 meeting and voted unanimously to recommend approval of this round, with appropriate management plan and Best Management Practices, to the EMC. The CAC was briefed at its September 27, 2012 meeting and it also voted unanimously to approve use of this training ammunition. Camp Edwards submitted a formal request letter to the EMC on October 24, 2012. The EMC voted at its meeting on December 11, 2012 to conditionally approve the use of the M781 40mm round and to authorize its Executive Director, Mr. Mark Begley, to issue an approval for the range management plan for use on Lima Range with appropriate best management practices.

2.5 CONSOLIDATION OF OPERATIONS, MAINTENANCE AND MONITORING PLANS

The regulatory processes, including working through the SARWG, to receive approval from the EMC and EPA Region 1 to resume firing lead ammunition at Tango, Juliet and Kilo ranges on Camp Edwards required the development of detailed OMMPs for each range. The Tango Range OMMP was published in June 2007 with revised plans published in December 2007 and January 2009. The separate OMMPs for Juliet and Kilo ranges were published in October 2008 with revised plans for both ranges published in January 2009. Limited revisions were also enacted at the request of EPA Region 1 and the EMC in 2011.

Through operational experience gained after the original OMMPs were written, several improvements that could be made to the plans were identified. The MAARNG developed a proposed consolidated Juliet, Kilo and Tango Range OMMP that would include identified improvements. A final consolidated OMMP for Juliet, Kilo and Tango ranges was submitted to EPA Region 1 and the EMC on September 7, 2012. EPA Region 1 issued a letter on October 4, 2012 modifying the provisions of its Administrative Order #2 to incorporate the consolidated plan for the three ranges.

Changes to the OMMP include the following:

- Consolidation of the three plans into one plan for all three ranges
- Deletion of extraneous information that is not related to protection of the environment
- Reorganization of the plan so that important tasks have their own primary section and aren't buried in various sub-sections
- Simplification of the range inspection procedures
- A streamlined environmental monitoring that accounts for lessons learned since the original OMMPs were written, while still ensuring protection of the environment
- A simplified action level process for soil, pore water and groundwater monitoring results to ensure environmental protection

2.6 SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

The MAARNG published a Supplemental Environmental Impact Report (SEIR) in August 2012. Legal notification was placed in the Cape Cod Times on August 14, 2012. The formal Notice of Availability was published in the Environmental Monitor on August 22, 2012 (Volume 78, Issue 8) with a 30-day public comment period ending on September 21, 2012. A public meeting on the SEIR was held at Camp Edwards on September 14, 2012 followed by a tour of the training areas and ranges. EOEEA issued a Certificate on September 29, 2012 approving the SEIR. The decision was published in the Environmental Monitor on October 8, 2012 (Volume 78, Issue 11).

The intent of the SEIR was to satisfy the requirements of the November 9, 2006 EOEA and August 10, 2007 EOEEA Secretary's Certificates to provide supplemental information on the use of the small arms ranges. Further intent of the SEIR was to allow the MAARNG to present the remainder of the Small Arms Range Improvement Project for state permitting, as appropriate, through the EMC in accordance with the Environmental Performance Standards as specific range designs, Best Management Practices, and Range Management Plans are developed. Any project, outside of the Small Arms Range Improvement Project, that exceeds MEPA threshold criteria or reduced threshold criteria in the Reserve/Training Area will require further MEPA review.

In the September 29, 2012 Certificate, the EOEEA Secretary determined that the SEIR adequately responded to the scope of the EOEA Certificate on the Notice of Project Change dated November 9, 2006 and that it was appropriate to allow details of range-specific pollution prevention (P2) plans to be finalized in the future through existing mechanisms to include the SARWG, SAC, CAC, EMC, and EPA Region 1 approval processes. Additionally, the Secretary indicated that the MAARNG would work closely with the EMC and its advisory councils, the SARWG and other stakeholders to address comments received on the SEIR from the EMC and the Association to Preserve Cape Cod (APCC).

The September 29, 2012 EOEEA Certificate is included in Appendix D. The SEIR with its thirteen appendixes is available on the E&RC website: www.E&RC.org.

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SECTION 3 ENVIRONMENTAL MANAGEMENT PROGRAMS AND COMPLIANCE WITH ENVIRONMENTAL PERFORMANCE STANDARDS

3.0 INTRODUCTION

The July 16, 2001 Certificate issued by EOEA approving the MMR Master Plan and Chapter 47 of the Acts of 2002 require the Annual Report to contain information describing the range of resource management activities conducted by the MAARNG in the Reserve and to report on each of the specific EPSs for the Reserve established by that process. Sections 3.1 through 3.19 include information for each of the nineteen EPSs in the same sequence as they appear in Appendix A. Section 3.20 provides similar information for the generic Cultural Resources EPS that also applies to MAARNG activities in the Reserve. In addition to meeting this requirement, Section 3 provides information on mitigation measures undertaken by the MAARNG and information on any noncompliance with the EPSs.

The July 16, 2001 Certificate also required information be reported for the past five years, whenever such data is available, to identify long-term trends in program activities. However, data is provided in this report back through TY 2002, when available, the year of publishing the first Annual Report. Additional information on environmental management activities performed in the Reserve during the past five years can be found on the Publications page of the E&RC web site at: www.EandRC.org.

Table 3-10, provided towards the end of this section, identifies the relevant federal, state, Department of Defense (DoD), and U.S. Army environmental regulations governing MAARNG activities in the Reserve.

3.1 GROUNDWATER RESOURCES MANAGEMENT

3.1.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Groundwater Environmental Performance Standard during TY 2012:

- No new stormwater discharges were directed in Zone 1 Wellhead Protection Areas of the Reserve.
- No in-ground septic systems were installed within Zone 1 Wellhead Protection Areas of the Reserve.
- No solid wastes were generated or held within Zone 1 Wellhead Protection Areas of the Reserve.
- Travel in Zone 1 Wellhead Protection Areas was limited to foot travel or to vehicles required for construction, operation or maintenance of wells.
- The MMR Groundwater Protection Policy is available on the Publications page of the E&RC website at: www.EandRC.org.
- The Upper Cape Water Supply Cooperative continues to have appropriate signage around the 400-foot radius of its three water supply wells in the Reserve.

- The Upper Cape Water Supply Cooperative continues to have fencing around its three water supply wells.
- A representative of the E&RC office routinely attended the bi-monthly meetings of the Upper Cape Regional Water Supply Cooperative to ensure continuing coordination of Cooperative activities in the Reserve.
- The MAARNG did not drill any new water supply wells in the Reserve; the wells at Range Control and the Ammunition Supply Point continue to be the only active water supply wells operated by the MAARNG in the Reserve. (Note: These two wells are not classified by the Commonwealth of Massachusetts as public water supply system wells because they do not exceed the state threshold established in 310 Code of Massachusetts Regulations [CMR] 22.02.)
- The Upper Cape Water Supply Cooperative operated within the water withdrawal limits of its MassDEP issued permit: a permit-authorized average of 3,000,000 gallons per day with an average withdrawal during TY 2012 of 1,196,000 gallons per day.
- The 102nd Intelligence Wing operated within the water withdrawal limits of its MassDEP issued registration: an authorized average of 540,000 gallons per day for a total withdrawal of 197,100,000 gallons per year.

3.1.2 Precipitation

Precipitation information included in the Annual Report for the TY 2002 through TY 2009 period was provided by the base weather station near the airfield in the Cantonment Area of Otis ANGB. With the loss of the F-15 fighter jets from Otis ANGB in the last Base Realignment and Closure round, the Otis ANGB weather station closed. Starting with data for TY 2010, precipitation information is obtained from the Northeast Regional Climate Center at Cornell University in Ithaca, New York, based on recordings from a station in East Sandwich, Massachusetts. That station reported a total of 50 inches of precipitation for TY 2012. Graph 3-1 reflects the amount of precipitation recorded since TY 2002.

Graph 3-1 Precipitation Recorded at MMR



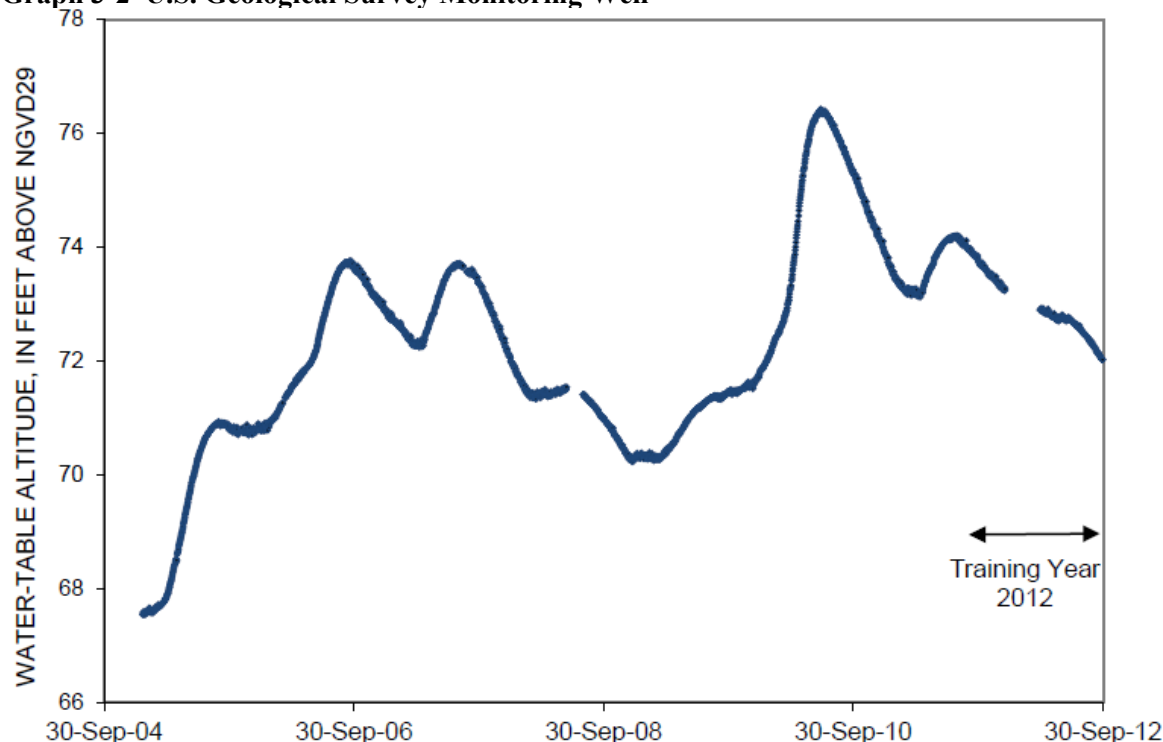
Note: Source of precipitation information changed with TY 2010 data. See explanation in above text.

3.1.3 Groundwater Level

During the early part of TY 2005, the U.S. Geological Survey (USGS) installed a monitoring well (USGS number MA-SDW 537-0107) on Camp Edwards to record the altitude of the water table in the Cape Cod aquifer. The well is located on the J-1 Range of the Reserve to the west of Greenway Road and is about 107 feet deep. A recording device in the well electronically transmits a continuous record of the water level at the top of the water-table mound that forms the Sagamore groundwater-flow system on western Cape Cod. The well's location is shown in Figure 3-1.

During TY 2012 (October 1, 2011 to September 30, 2012), the water-table altitude (in feet above the National Geodetic Vertical Datum of 1929, also referred to as sea level) declined about 1.7 feet. This pattern of water-level decline was observed at most USGS monitoring wells on Cape Cod and reflects a general decline in groundwater levels from the record-high water levels observed Cape-wide in 2010. Graph 3-2 shows the trend in the water-table altitude at the USGS monitoring well for the 2005-2012 training years.

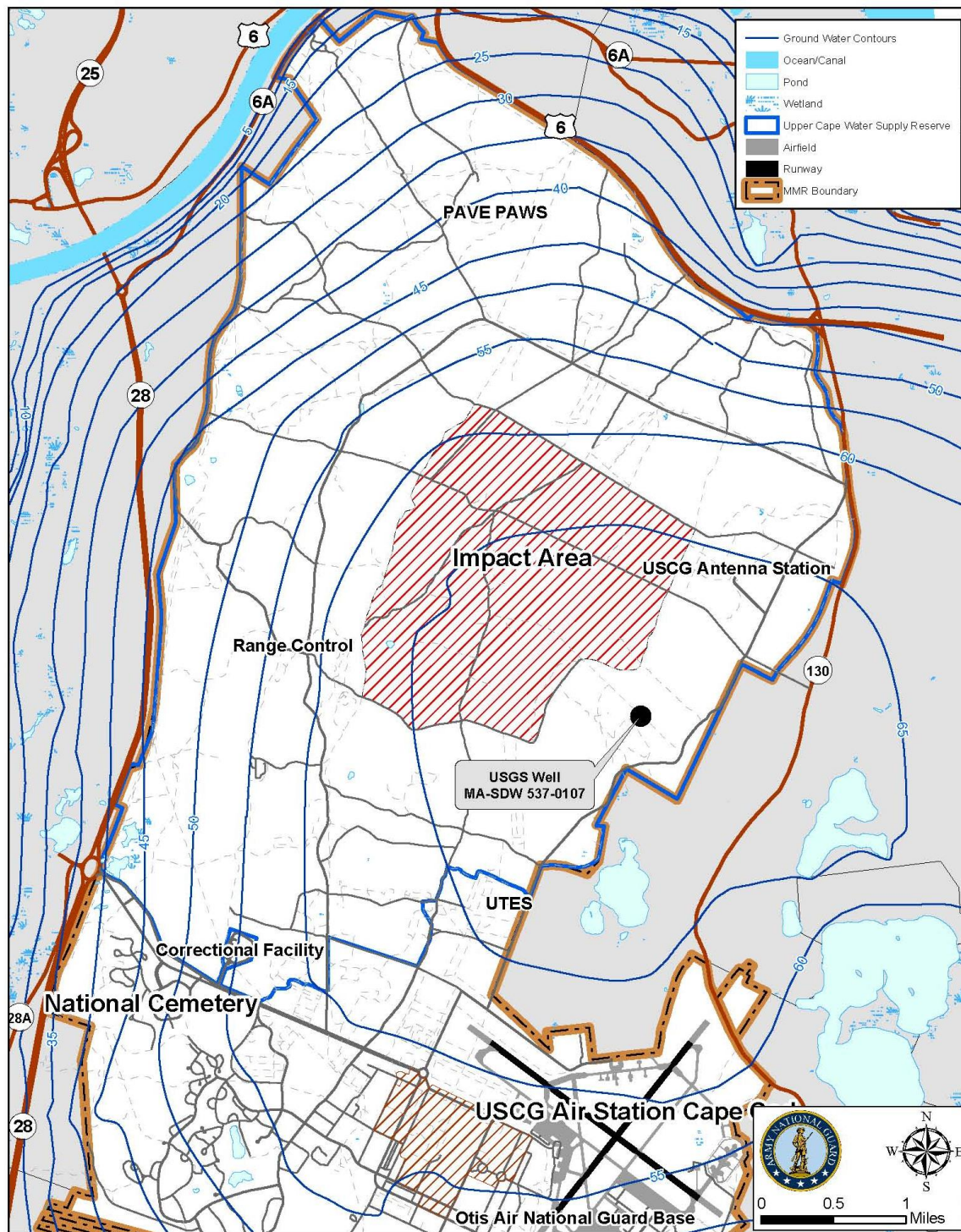
Graph 3-2 U.S. Geological Survey Monitoring Well



The IAGWSP provided part of the funding for the installation and operation of the monitoring well because the water-level data are used in that program. The well became operational in January 2005. Information from the well is publicly available on the following USGS websites:

<http://ma.water.usgs.gov/MMRCape/wl.html>
<http://ma.water.usgs.gov/infodata>

Figure 3-1 U.S. Geological Survey Monitoring Well Location

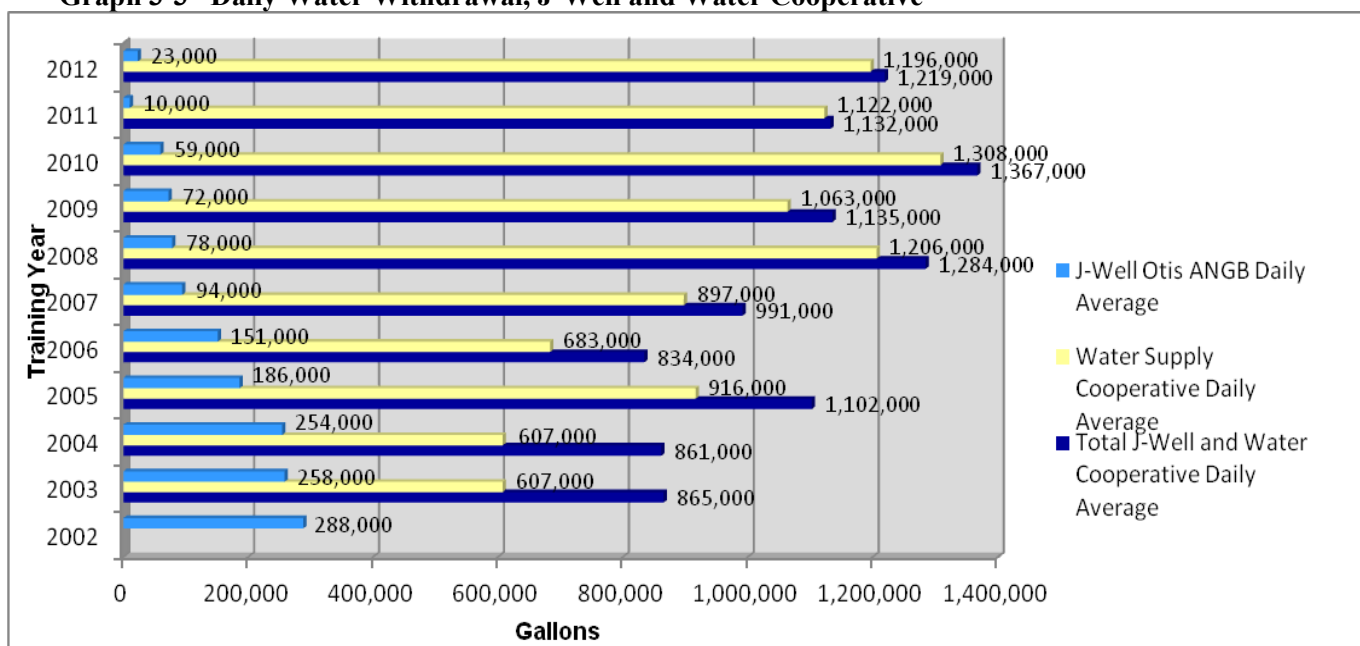


3.1.4 Water Supply Systems

3.1.4.1 Upper Cape Regional Water Supply Cooperative

The Upper Cape Regional Water Supply Cooperative provided 437,775,000 gallons of water (a daily average of 1,196,000 gallons) from its three wells to the six public water supply systems it services during TY 2012: Bourne Water District, Mashpee Water District, Sandwich Water District, the Town of Falmouth water system, the Barnstable County Correctional Facility, and the Otis ANGB water supply system. Graph 3-3 shows the daily average pumping rate of the Cooperative since TY 2003, its first full year of production. The locations of the Cooperative's three water supply wells (WS-1, WS-2, WS-3) and its seven sentry monitoring wells (C-1 through C-7) are shown in the figure in Appendix E.

Graph 3-3 Daily Water Withdrawal, J-Well and Water Cooperative



Note: The Water Supply Cooperative didn't start pumping water until near the end of TY 2002. Thus, data in the graph for the Water Supply Cooperative is reflected commencing with its first full year of operation in TY 2003. TY 2011 information is adjusted from what appeared in the TY 2011 Annual Report.

The Cooperative was not required, under the provisions of its Long Term Water Quality Monitoring Plan, to sample its monitoring wells during TY 2012. Appendix E includes graphs developed by the USGS which trend Upper Cape Regional Water Supply Cooperative sentry well data over the years.

Questions concerning the Cooperative's activities should be directed to the Cooperative through Mr. Larry Dayian, Sarian Company, at (508) 888-7262.

3.1.4.2 Otis ANGB Public Water Supply System

The Otis ANGB system pumped an average of 23,336 gallons of water per day and a total of 8,541,000 gallons of water from its well during TY 2012. It also received 60,912,000 gallons from the Cooperative during TY 2012; a daily average of 165,194 gallons. Graph 3-3 shows the daily average pumping rate of the Otis system since TY 2002.

A copy of the calendar year 2011 Water Quality Report published by the 102nd Intelligence Wing in May 2012, as required by the Consumer Confidence Rule provisions of the 1996 Amendments to the Safe Drinking Water Act, is provided in Appendix E. Also included in Appendix E are graphs developed by the USGS that trend the J-Well data.

Questions concerning the water supply system operated by the 102nd Intelligence Wing should be directed to its Water Supply Superintendent at 508-968-4102.

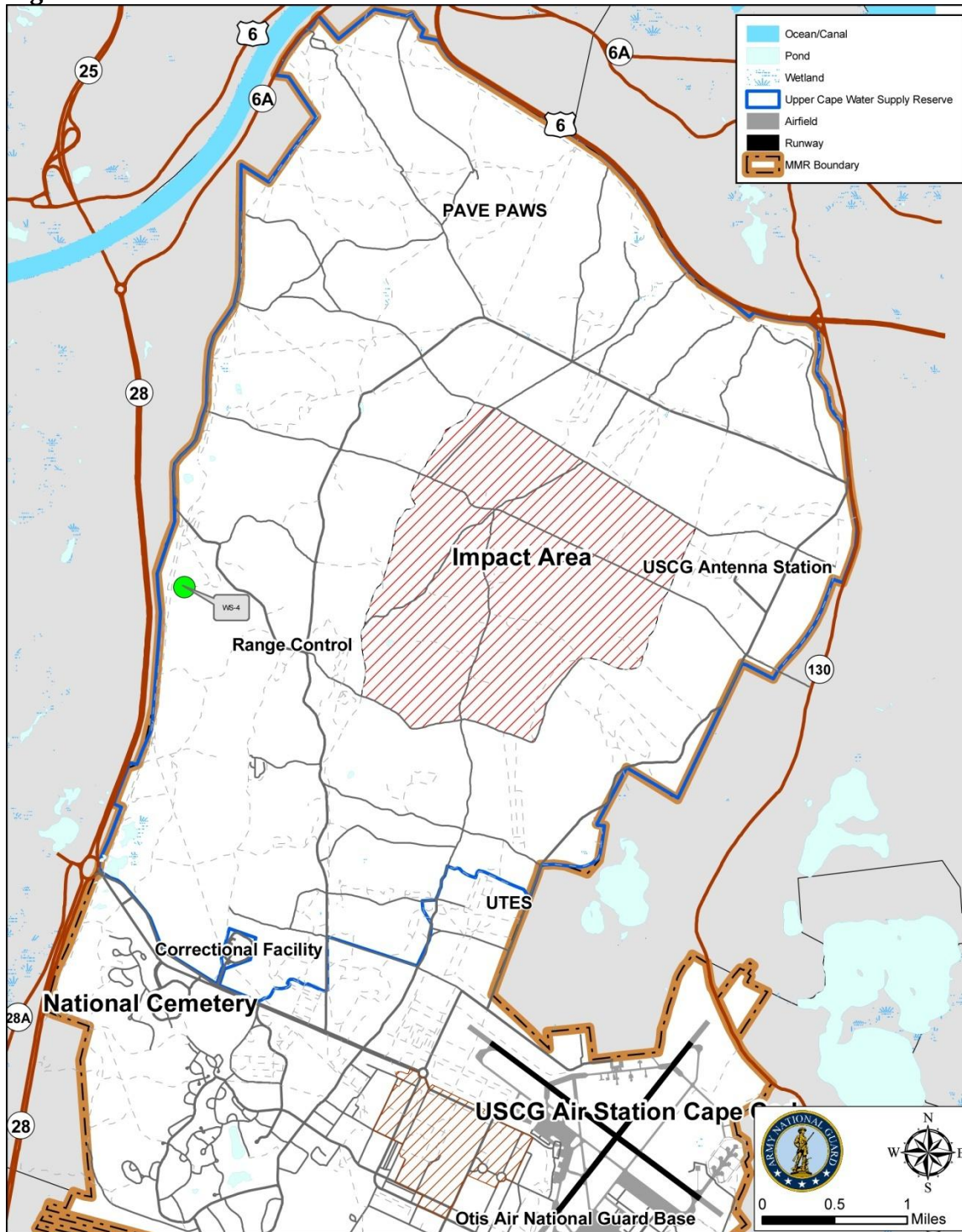
3.1.4.3 Bourne Water District Potential Water Supply Well

In September 2008, the Bourne Water District submitted a request to the Massachusetts National Guard to access the WS-4 well site in the western portion of the MMR, just west of the district's water storage tank on the MMR. This well site was initially a component of the supply system under investigation for the Upper Cape Regional Water Supply Cooperative, but due to its remote location in regard to the other well sites, its lower potential production capacity, and the amount of additional pipeline that would have to be installed in the Reserve, it was not developed and made part of the Cooperative's system. This water supply development action is being funded by the Air Force Civil Engineer Center (AFCEC), formerly the Air Force Center for Engineering and Environment (AFCEE), as a component of a well-replacement associated with existing wells down-gradient from the contamination plume (LF-1) emanating from the closed base landfill. The Bourne Water District had requested and received permission from MassDEP for development of WS-4 as a drinking water supply. The well's location is shown in Figure 3-2.

A pumping test was conducted by the Bourne Water District on the temporary well installed during the Cooperative's investigation of the WS-4 site, and water quality monitoring has been ongoing at and upgradient of the well site. MassDEP approved the pump test results on February 26, 2008 and the Bourne Water District board voted on April 8, 2008 to proceed with applicable actions concerning WS-4.

Officials from the Bourne Water District and its engineering firm, Haley and Ward, Inc., met during TY 2009 with representatives from the Massachusetts National Guard, the Installation Restoration Program (IRP), the EMC's Environmental Officer, and the Massachusetts Division of Fisheries and Wildlife (MADFW) to discuss the various real estate and environmental actions necessary to receive approval to bring the well into a production status as part of the Bourne Water District. The Bourne Water District submitted its formal real estate property request for access to the WS-4 well during TY 2010. The Bourne Water District submitted an Environmental Notification Form (ENF) to the MEPA office in December 2010. It was published in the Environmental Monitor on December 22, 2010 (Volume 75, Issue 3). EOEEA issued a Certificate on January 7, 2011 (Volume 75, Issue 6) indicating that no further MEPA review was required, that the Bourne Water District could resolve any remaining issues through direct consultation with MADFW and through the MassDEP permitting process, and that the project could proceed to permitting.

Figure 3-2 Well Site 4 Location



The ENF and EOEEA Certificate can be found on EOEEA's Massachusetts Environmental Policy Act web site at: <http://www.env.state.ma.us/mepa/>

Officials from the Bourne Water District briefed the SAC on April 6, 2011 and the CAC on April 21, 2011. A meeting was held at the state house in Boston on June 23, 2011 at which time a draft legislative act, which would grant access to the Bourne Water District, prepared by MADFW, was discussed.

Legislation was introduced during TY 2012 (Bill S.2215) which was signed into law by Governor Deval Patrick on July 31, 2012. The legislation authorizes the Department of Fish and Game to lease the WS-4 well site land to the Bourne Water District for a period not to exceed 99 years. The Bourne Water District held a meeting on August 22, 2012 with officials from organizations involved in the action to identify appropriate steps necessary to develop and issue the lease document. Three representatives from the MAARNG attended the meeting: one from the Massachusetts National Guard Joint Force Headquarters in Milford, Massachusetts, and two from the E&RC. The applicable real property document is expected to be issued during TY 2013.

Bourne Water District representatives attended the EMC meeting on December 11, 2012 and requested that the EMC support the proposed well and pump station as planned, consistent with the intent and purpose of the Upper Cape Water Supply Reserve. The EMC voted in favor of the motion.

3.2 WETLANDS AND SURFACE WATER MANAGEMENT

3.2.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Wetlands and Surface Water Environmental Performance Standard during TY 2012:

- The MAARNG did not take any actions during the year that resulted in the loss of any wetland resources or their 100-foot buffer areas.
- Representatives of the E&RC routinely attended the meetings of the MMR Cleanup Team, as well as numerous coordination meetings held by the IAGWSP, to stay abreast of the IAGWSP's remediation activities in the Reserve and to ensure appropriate coordination existed between appropriate offices and that remediation activities did not impact wetlands areas.
- No new bivouac areas were created in the Reserve during the year within 500 feet of any wetland.
- No land alteration activities were conducted by the MAARNG within 100 feet of a certified vernal pool during the year.
- Eight water bodies were surveyed during TY 2012.
- One Vernal Pool Observation Form was submitted in TY 2012.

3.2.2 Vernal Pools

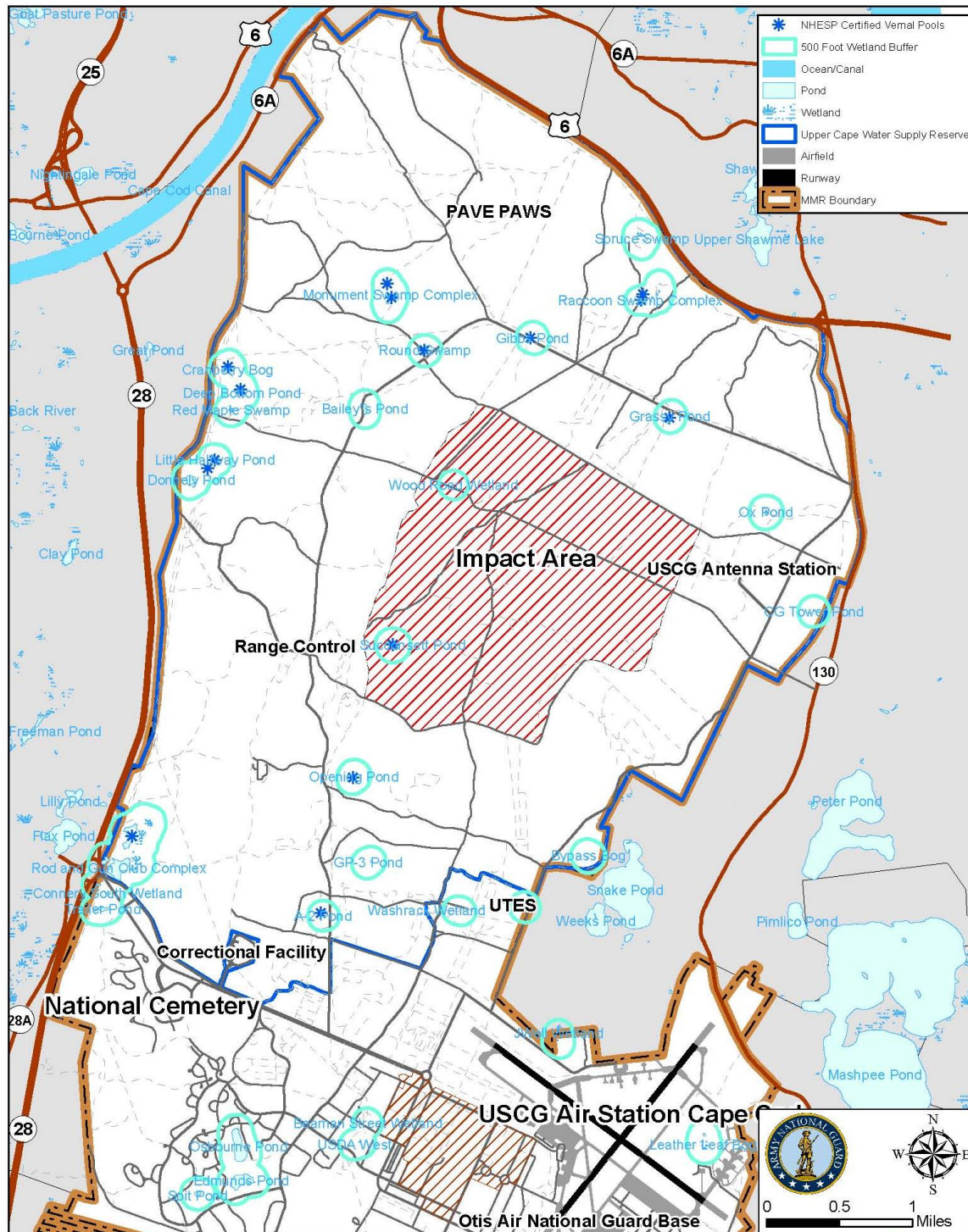
The Natural Resource Office submitted a Vernal Pool Observation Form to the Natural Heritage and Endangered Species Program (NHESP) office in August 2012 for Raccoon Swamp C, located in Training Area C-15.

Eight water bodies, including Raccoon Swamp C, were surveyed during TY 2012 for obligate vernal pool species to certify vernal pools on Camp Edwards. Other water bodies surveyed included: Little Halfway Pond, Tank Trail Pond, Gibbs Pond, and Monument Swamp Cistern. Additionally, surveys were conducted of the following wetlands in TY 2012: Donnely Pond, Red Maple Swamp and Bailey's Pond.

Table 3-1 lists the certified vernal pools in the Reserve. Figure 3-3 shows the locations of the over twenty vernal pools and wetlands on Camp Edwards. Raccoon Swamp C was the only submission pending NHESP action as of September 30, 2012.

TABLE 3-1 VERNAL POOL CERTIFICATION STATUS			
Wetland Name	Date Certified	Training Area Located In	Area (Acres)
A2 Pond	March 2006	A 2	0.41
Bypass Bog	August 2011	Across from J Ranges	1.74
Cranberry Bog	March 2006	B 9	2.31
Deep Bottom Pond	March 2006	B 9	1.33
Gibbs Pond	March 2006	C 14	0.54
GP-3	September 2011	BA 7	0.79
Grassy Pond	March 2006	South of Gibbs Road	0.40
Little Halfway Pond	March 2006	B 8	0.65
Monument Swamp	March 2006	B 11	1.76
Monument Swamp Cistern	August 2008	B 1	0.36
Opening Pond	March 2006	North of G Range	0.87
Ox Pond	September 2011	Whipp Road, Southeast of BA 5	0.11
Raccoon Swamp A	March 2006	C 14	0.49
Raccoon Swamp B	March 2006	C 15	0.73
Raccoon Swamp D	August 2011	C 15	0.18
Raccoon Swamp E	August 2011	C 15	1.64
Round Swamp	August 2008	B 10	0.49
Skeet Range Pool	March 2006	Near Otis Fish & Game Club	0.10
Spruce Swamp	September 2011	C 14	2.67
Succonsett Pond	March 2006	Central Impact Area	1.33
Tank Trail Pond	August 2008	B 8	1.03

Figure 3-3 Vernal Pools and Wetlands



3.3 RARE SPECIES MANAGEMENT

3.3.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Rare Species Management Performance Standard during TY 2012:

- The members of the field crew hired for the summer of 2012 observed and reported on rare species in the Reserve.
- The Natural Resource Office observed eleven species listed under the Massachusetts Endangered Species Act (MESA) on Camp Edwards in TY 2012, including 5,113 individuals, and reported the sightings to NHESP. (See Table 3-2)
- The Natural Resource Office observed four species of grassland birds (Grasshopper Sparrow, Northern Harrier, Upland Sandpiper, and Vesper Sparrow) listed under MESA on Camp Edwards in TY 2012, including forty-nine individuals, and reported the sightings to NHESP.
- During TY 2012, the Natural Resource Office staff reviewed and formally coordinated on sixteen Records of Environmental Consideration (RECs) for proposed actions in the Reserve as well as meeting and informally reviewing other proposed military and civilian activities in the Reserve to ensure that adverse impacts to natural resources (including state-listed endangered species) were avoided or mitigated.
- No federally-listed rare species have been identified in the Reserve to date. (Note: The New England Cottontail rabbit (*Sylvilagus transitionalis*) has been proposed for federal listing under the U.S. Endangered Species Act and is a Candidate Species. This species has been documented on Camp Edwards. [See Section 3.3.4.]

3.3.2 Rare Species Reporting

Table 3-2 identifies the rare species sightings reported to NHESP for the past five years. Reported sightings since the first Annual Report was published in TY 2002 are provided in Appendix F. The fluctuation in numbers of rare species reported is attributed to a variety of factors, including but not limited to: the time and length of surveys, locations where surveys are conducted (the same environmental monitoring plots are not necessarily visited each year), mowing schedules in the Cantonment Area, mowing procedures and schedules in the airfield area, intensity of the surveys, the number and experience of summer field crew personnel, weather conditions during the times available for surveys, locations where soldiers may train during the training year, familiarity of individual soldiers and others utilizing the various training areas and training support areas on Camp Edwards with rare species, etc. With these limitations and the varied associated counting procedures and efforts, the numbers contained in Table 3-2 do not necessarily reflect changes or trends in populations. These are just raw number counts that are reported to NHESP based on sightings.

The transfer of the 1,500-acre airfield (including runways and airfield grasslands) from the MAANG to the USCG resulting from the Base Realignment and Closure Commission's directed loss of the MAANG's flying mission at Otis ANGB affects the counts of four bird species (Upland Sandpiper, Grasshopper Sparrow, Vesper Sparrow, Northern Harrier) starting in TY 2011.

**TABLE 3-2
LIST OF RARE SPECIES REPORTED TO NHESP**

Individuals Reported					
Common / Scientific Names	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
BIRDS					
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	64	68	50	26	40
Northern Harrier (<i>Circus cyaneus</i>)	4	4	9	4	5
Upland Sandpiper (<i>Bartramia longicauda</i>)	15	29	29	3	3
Northern Parula (<i>Parula americana</i>)	0	1	0	0	0
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	0	1	0	0	0
Vesper Sparrow (<i>Pooecetes gramineus</i>)	6	3	8	3	1
Whip-poor-wills (<i>Antrostomus vociferous</i>)	N/A	N/A	N/A	N/A	201
REPTILES and AMPHIBIANS					
Eastern Box Turtle (<i>Terrapene carolina carolina</i>)	15	10	13	29	13
ODONATES					
Comet Darner (<i>Anax longipes</i>)	3	9	6	14	4
Spatterdock Darner (<i>Aeshna mutata</i>)	24	13	7	10	14
PLANTS					
Adder's Tongue Fern (<i>Ophioglossum pusillum</i>)	458	0	138	48	84
Broad Tinker's Weed (<i>Triosteum perfoliatum</i>)	99	69	56	233	332
Torrey's Beak Rush (<i>Rhynchospora torreyana</i>)	2,350	2,550	4,800	2,606	4,416
Total	3,038	2,757	5,116	2,976	5,113
Notes: 1. Counts of Upland Sandpipers, Grasshopper Sparrows, Vesper Sparrows and Northern Harriers (all grassland bird species) through TY 2010 include counts of these species on the 1,500 acre airfield / airfield grassland area that was once part of Otis ANGB. The airfield and airfield grasslands were transferred to the U.S. Coast Guard as a result of the MAANG losing its flying mission during the last Base Realignment and Closure round. 2. As part of its initiative to document whip-poor-will densities, NHESP requested reporting whip-poor-will counts effective in TY 2012.					

3.3.4 New England Cottontail Rabbit Study

The Natural Resource Office began a study in TY 2010 on the New England Cottontail rabbit, a candidate species for federal listing. The study objectives are to determine the home range and habitat preferences of the species. This information can be used regionally to determine effective management efforts for this potential species.

Eleven rabbits were trapped, collared and tracked in TY 2012 (Photographs 3-1a and 3-1b). Deoxyribonucleic acid (DNA) samples were taken from the rabbits and processed by the University of Rhode Island. Nine of the rabbits were confirmed to be New England Cottontails, while two rabbits were confirmed to be Eastern Cottontails. The length of time the rabbits were tracked in TY 2012 ranged from 0.20 to 6.73 months. The average length of time a rabbit was tracked was 2.76 months. Locations were obtained four times a week for each rabbit. No rabbits were being tracked as of the end of TY 2012. Trapping will commence again during the winter, and tracking will continue to determine rabbit home range size and habitat preferences.

Photograph 3-1a and 3-1b New England Cottontail Rabbits trapped and collared at Camp Edwards during TY 2012 to obtain home range size and habitat preference to effectively manage for this candidate species.



3.4 SOIL CONSERVATION MANAGEMENT

3.4.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Soil Conservation Performance Standard during TY 2012:

- All military and civilian uses and activities in the Reserve during the year were reviewed by the Natural Resource Office to ensure that they were compatible with the limitations of the underlying soils. All users were instructed to report evidence of soil erosion to Range Control so that potential repairs to roads, bivouac areas and well pads could be identified in a timely manner.
- No new perennial or intermittent streams were identified in the Reserve during the year.

- None of the existing unimproved roads in the Reserve were made into improved roads as a result of IAGWSP remediation activities during the year. Additionally, any maintenance on unimproved roads during the year did not involve paving the roads.

3.4.2 Erosion

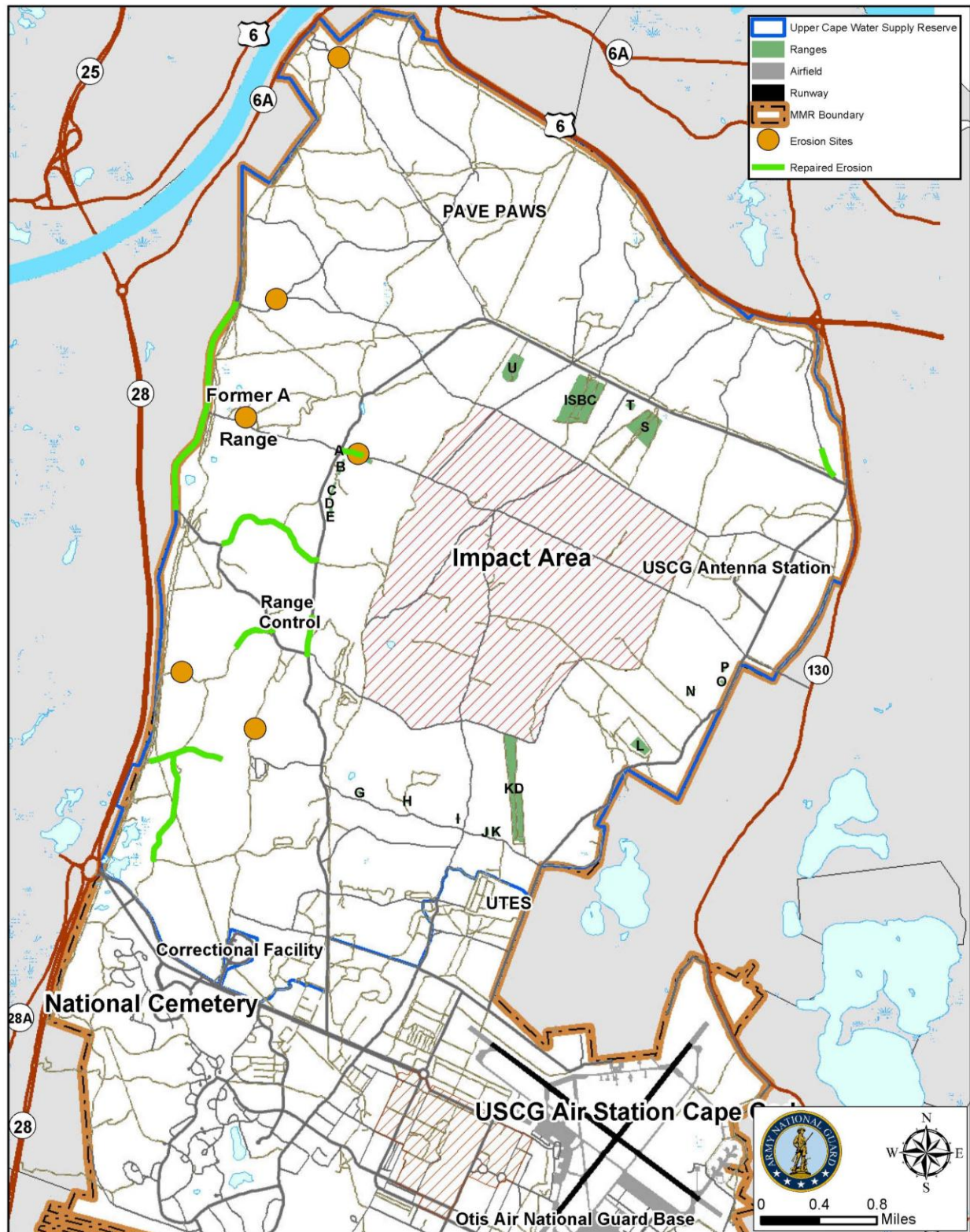
Figure 3-4 shows the locations of five erosion sites identified during TY 2012 through the Sustainable Range Program which is a combination of efforts by the Natural Resource Office, Range Control and Facilities Engineering staffs. As sites are identified, they are programmed for repairs using available Facilities Engineering personnel and equipment, and troop labor from Army National Guard engineering units, if available. The figure also shows the following locations where repair work was performed during TY 2012: Wood Road, Gibbs Road, Turpentine Road, Canal View Road, Estey Road, and Wheelock Road.

As part of the IAGWSP investigation work at Former A Range, the program investigated and remediated the site with regards to unexploded ordnance. As a result, severe erosion occurred at the site (see Photograph 3-2; location also shown on Figure 3-4). The IAGWSP has taken action to include the installation of silt fence and hay bales to prevent further erosion. They have also hydro seeded the site to stabilize the soil and prevent any future erosion events. The seed mix used consisted of creeping red fescue, fawn tall fescue, annual rye grass, redtop bentgrass, and Ladino white clover.

Photograph 3-2 Severe erosion on Former A Range.



Figure 3-4 Erosion Sites Identified and Repaired in TY 2012



3.5 VEGETATION MANAGEMENT

3.5.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Vegetation Management Performance Standard for TY 2012:

- Three members of the summer field crew hired for the summer of 2012 focused on vegetation surveys. Another member split time between vegetation and wildlife projects.
- Vegetation surveys were conducted at twenty-one environmental monitoring plots during TY 2012 as part of the Range and Training Land Assessment (RTLA) program. (See photograph 3-3)
- 8,578 invasive plant species stems were removed during the year.
- No timber harvests occurred in the Reserve during the year.
- During the year, field crews visited known populations of the following state-listed plant species on Camp Edwards to ascertain their status and to gather data for rare species reporting purposes: (Note: See Table 3-2 for numbers counted in TY 2012.)
 1. Adder's Tongue Fern – threatened (present at one location)
 2. Broad Tinker's Weed – endangered (present at five locations)
 3. Torrey's Beak Rush – endangered (present at one location)
- One prescribed burn was conducted by the MAARNG in the Reserve.

Photograph 3-3 A TY 2012 field crew member standing along a line transect at the 0-meter marker indicating the plot number (# 521) and azimuth of the transect. This photograph also shows the type of vegetation along this environmental monitoring plot.



Credit: MANG Natural Resource Program

3.5.2 Vegetation Surveys

As part of the RTLA component of the Army's Integrated Training Area Management (ITAM) program, vegetation surveys were conducted during TY 2012 at twenty-one environmental monitoring plots for control and management purposes. At present, there are approximately 250 environmental monitoring plots with efforts made to survey a portion of them each summer based on a variety of factors such as: funding, manpower, weather conditions, other workload priorities, etc. The actual plots surveyed each year vary, as does the frequency to which various plots are visited.

During the year, a survey was also conducted at thirty-nine sites currently or historically used for military training. The focus of vegetation surveys has also shifted to be more inclusive of areas currently or historically experiencing military training. This shift will better determine military training impacts, identify needs for restoration, and provide information on suitable uses for specific areas. Table 3-3 provides information on the number of environmental monitoring plots surveyed in each habitat type. Table 3-4 provides information on the number of environmental monitoring sites surveyed since TY 2002.

TABLE 3-3 RTLA SURVEYS FOR CAMP EDWARDS – TY 2012		
Habitat	Plots Surveyed for Birds	Plots Surveyed for Vegetation
Disturbed	8	8
Pitch pine oak forest	5	5
Scrub oak shrubland*	9	1
Black oak scarlet oak forest	2	2
Cultural grassland	4	4
Scotch pine pitch pine scrub oak community	1	1
TOTALS	29	21
*For safety reasons, potential unexploded ordnance hazard, plot surveys in the Central Impact Area are limited to bird surveys.		

TABLE 3-4 RTLA SURVEYS FOR CAMP EDWARDS – HISTORY		
Training Year	Bird Surveys	Vegetation Surveys
TY 2012	29	21
TY 2011	39	41
TY 2010	50	2
TY 2009	68	58
TY 2008	63	63
TY 2007	56	56
TY 2006	59	59
TY 2005	58	62
TY 2004	61	51
TY 2003	32	0
TY 2002	32	21
Note: Vegetation surveys were not conducted in TY 2003 because a Forest Resource Inventory Survey was conducted that year.		

Figure 3-5 provides a visual presentation of the environmental monitoring plots surveyed during TY 2012.

3.6 HABITAT MANAGEMENT

3.6.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Habitat Management Performance Standard during TY 2012:

- The Natural Resource Office conducted vegetation surveys at twenty-one Environmental Monitoring Plots during TY 2012 and at thirty-nine areas currently or historically used for training. (See Figure 3-5 and Figure 3-7) These surveys are used to observe effects of training on the environment and provide indicators when a training area may need rehabilitation or habitat management such as prescribed burning.
- The Natural Resource Office completed the third year of a New England Cottontail rabbit study. The office manages for early successional habitat required for rare species such as the New England Cottontail. Habitat management for this species compliments management for military training. Habitat management consists of mechanical clearing or prescribed burns.
- One prescribed burn was conducted in the Reserve during TY 2012 for habitat management purposes. (See Section 3.11.2)
- A total of 8,578 invasive plant species stems from five invasive species were eradicated during TY 2012.

3.6.2 Invasive Plant Species Control Activities

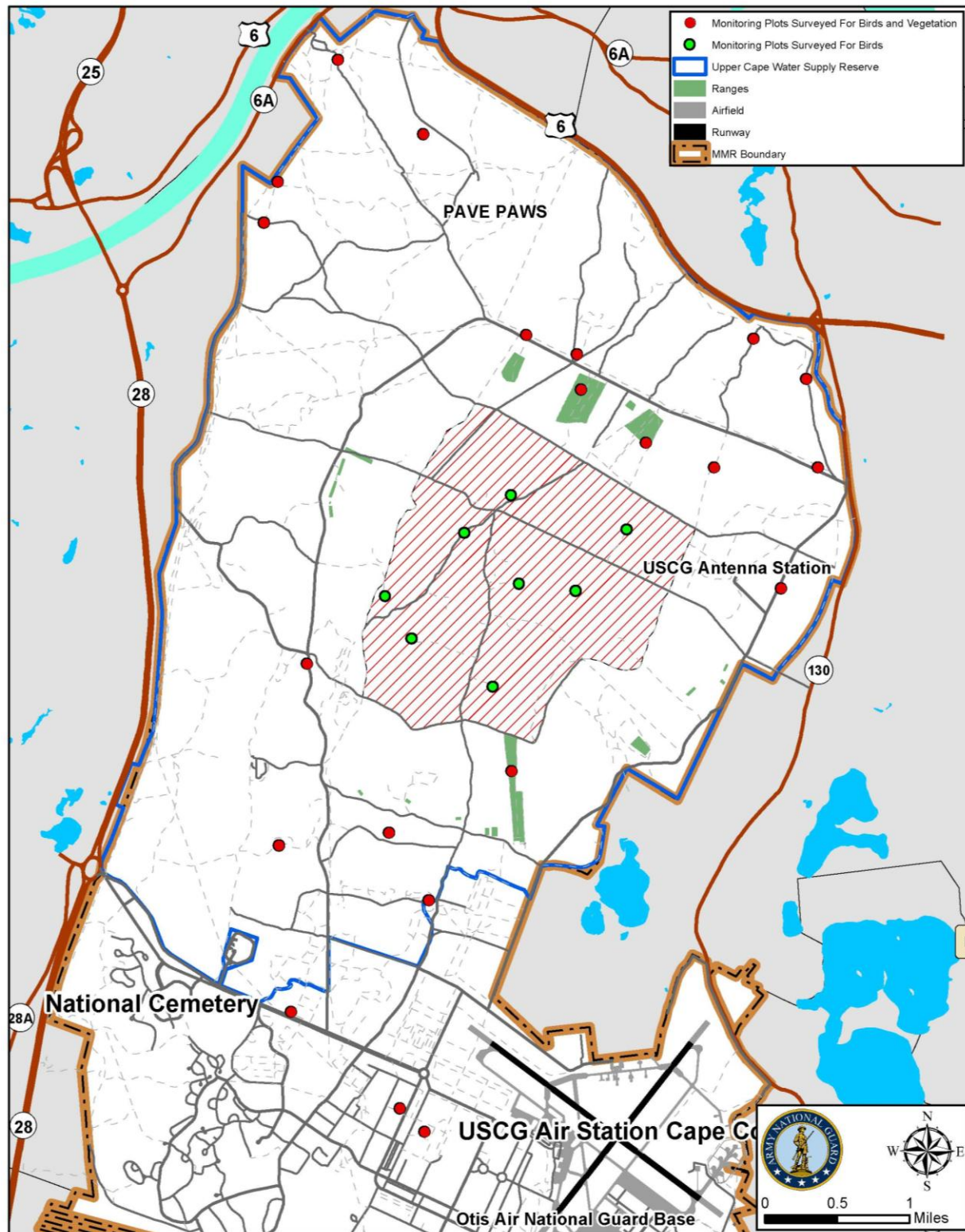
Invasive plants can be native or non-native species that have spread into native or minimally managed plant systems in Massachusetts. They can cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. As defined here, “species” includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation; from the Massachusetts Invasive Plants Advisory Group (MIPAG).

On Camp Edwards, pitch pine (*Pinus rigida*) can act as a native invasive. Disturbed and early successional areas of Camp Edwards can be dominated by pitch pine. In turn, management actions to thin these areas of pitch pine need to occur to prevent a monoculture of this species. Preventing a monoculture of pitch pine allows for greater plant and animal diversity to develop in the area of pitch pine thinning.

Table 3-5 provides data on native and non-native invasive species control on Camp Edwards for the past five Training Years. Control activity since the first Annual Report was published in TY 2002 is provided in Appendix F.

The fluctuation in numbers from year to year is attributed to a variety of factors, including but not limited to: the time and length of effort dedicated to this activity, mowing schedules in the Cantonment Area, the number and experience of summer field crew personnel, weather conditions during the times available for this activity, land locations where the species are located, etc.

Figure 3-5 Environmental Monitoring Plots Surveyed During TY 2012

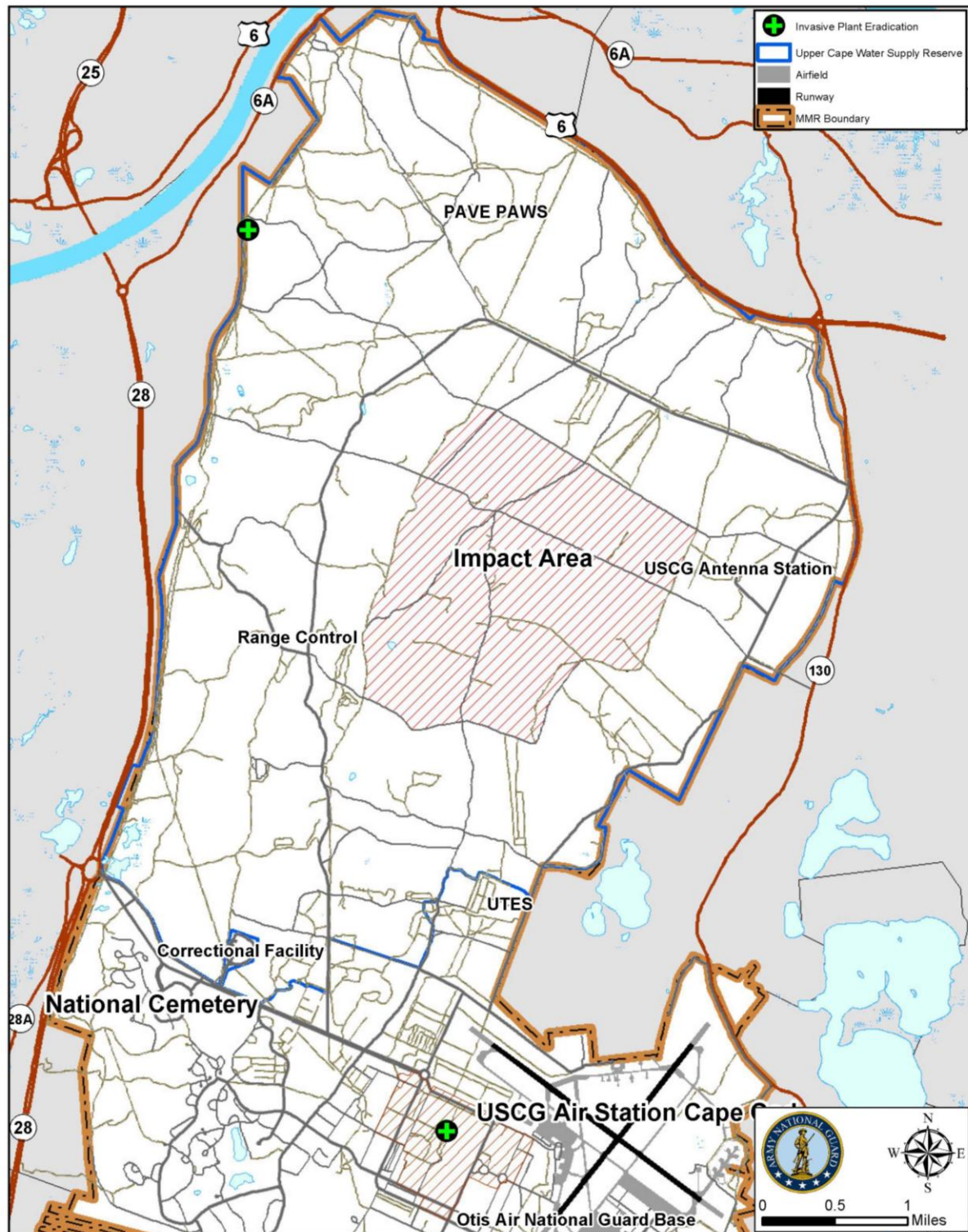


Typically, the greater amount of control activity occurs in the Cantonment Area. This was the case in TY 2012 with 8,401 of the 8,578 stems eradicated (97 percent) in the Cantonment Area. The pitch pine elimination in the Cantonment Area in TY 2012 was a combined effort of a Wildland Fire Chainsaw Course, two group days with AmeriCorps, and the efforts of the summer field crew, Senior Environmental Corps and AmeriCorps volunteers cutting back smaller pitch pines.

Figure 3-6 shows the general locations where control activity occurred in the Reserve/Training Area and Cantonment Area of Camp Edwards during TY 2012.

TABLE 3-5 NATIVE AND NON-NATIVE SPECIES CONTROL ACTIVITY ON CAMP EDWARDS FIVE YEAR HISTORY						
Common / Scientific Names	MIPAG* Status	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
Pitch pine** (<i>Pinus rigida</i>)	Native No MIPAG Status	0	0	0	1,076	6,735
Honeysuckle (<i>Lonicera sp.</i>)	Invasive	4,919	382	1,920	1,247	760
Autumn olive (<i>Elaeagnus umbellata</i>)	Invasive	1,400	1,509	62	173	834
Multiflora rose (<i>Rosa multiflora</i>)	Invasive	237	139	53	58	191
Scotch broom (<i>Cytisus scoparius</i>)	No designation	0	1	0	0	0
Japanese Knotweed (<i>Polygonum cuspidatum</i>)	Invasive	0	0	44	0	0
Japanese barberry (<i>Berberis thunbergii</i>)	Invasive	0	0	0	1	0
Forsythia (<i>Forsythia sp.</i>)	Non-native No MIPAG Status	0	0	0	1	0
Winged Euonymus (<i>Euonymus alata</i>)	Invasive	0	0	525	0	0
Oriental bittersweet (<i>Celastrus orbiculatus</i>)	Invasive	0	155	74	75	58
TOTALS***		6,556	2,186	2,678	2,631	8,578
*MIPAG – Massachusetts Invasive Plants Advisory Group. **Pitch pine can act as a native invasive and needs thinning based on management objectives. ***Numbers are based on stem counts.						

Figure 3-6 General Locations of Invasive Species Control Activity During TY 2012



3.7 WILDLIFE MANAGEMENT

3.7.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Wildlife Management Performance Standard during TY 2012:

- The Natural Resource Office completed the third year of a New England Cottontail rabbit study.
- The Natural Resource Office applied for and received five permits from MADFW to conduct specific activities by the staff during the year.
- Range Control was involved in the approval, planning, scheduling, and supervision of deer hunting activity in the Reserve.
- Range Control was involved in the approval, planning, scheduling, and supervision of turkey hunting activity in the Reserve.
- One member of the field crew hired for the summer of 2012 split time between wildlife and vegetation activities.
- The Natural Resource Office conducted bird surveys at twenty-nine environmental monitoring plots in the Reserve in TY 2012.
- The Natural Resource Office identified 5,113 specific occurrences of rare species in TY 2012 for reporting to NHESP. (See Table 3-2)

3.7.2 Wildlife Environmental Permits

The Natural Resource Office received five permits from MADFW to conduct specific activities during TY 2012. The permits were as follows:

- Salvage Permit - This permit, dated April 2, 2012, authorizes the salvage of any reptiles, amphibians, mammals, and birds found dead on Camp Edwards, except for white-tailed deer. It also includes a provision that the salvage of birds may require an additional federal migratory bird permit.
- Scientific Collection Permit (Mammals) - This permit, dated February 23, 2012, authorizes the taking of small mammals in the shrew, mole, rats, and mice families, with certain exceptions, by live trap and pitfall to be marked and released at the point of capture.
- Scientific Collection Permit (Reptiles and Amphibians) - This permit, dated February 23, 2012, authorizes the capture with pitfalls, hand net or by hand any reptile or amphibian species to be released alive within 24 hours at the point of capture. It also authorizes the marking of turtles with non-toxic paint for mark and recapture, and the attachment of radio transmitters on up to thirty Eastern Box Turtles.
- Scientific Collection Permit (Fish) - This permit, dated February 23, 2012, authorizes the capture of all fish species except those listed as endangered, threatened or of special concern by electroshocking, seines and fish traps. It also limits the number of game species collected to numbers that do not exceed creel limits.

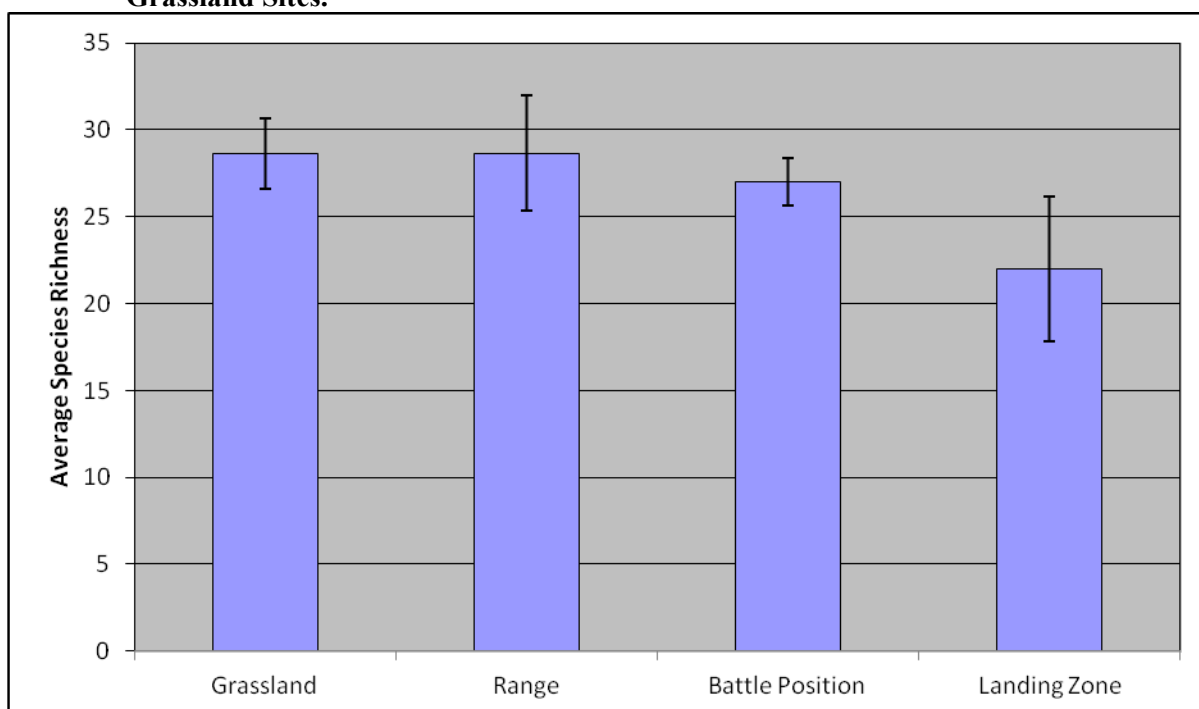
- Scientific Collection Permit (Mammals) – This permit, dated February 23, 2012, authorizes the capture of ten to fifteen New England Cottontail rabbits and to fit them with radio transmitters prior to release. It also authorizes taking blood and tissue samples from ears.

3.7.3 Bird Surveys

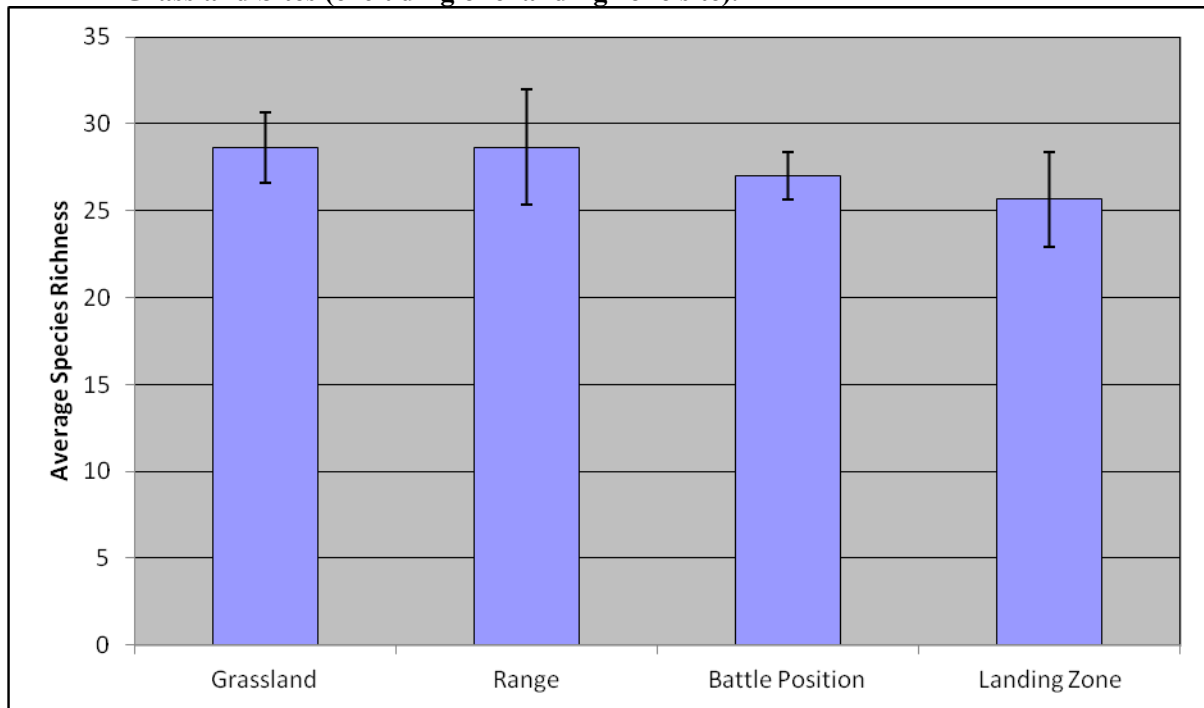
Bird surveys are part of the survey process conducted under the RTLA program at Camp Edwards. During TY 2012, the Natural Resource Office conducted two types of bird surveys. The first study consisted of visiting twenty-nine environmental monitoring plots to evaluate the effects of military training at landing zones, battle positions and ranges on bird species richness in comparison to grassland sites (a similar native open habitat type). Table 3-3 in Section 3.5.2 provides information on the number and types of environmental monitoring plots that bird surveys were conducted at during TY 2012.

The average species richness was the same at ranges and grassland sites (Graph 3-4a). Although battle positions had slightly lower average species richness, the values are not significantly different. Landing zones did show significantly lower species richness; however, this is strongly influenced by the low number of species observed at one site. This was also the only site surveyed during any precipitation; this could have impacted the number of species singing or active during the time of the survey. When this site is taken out of the analysis, the average species richness is not significantly different from grassland sites (Graph 3-4b).

Graph 3-4a. Average Bird Species Richness at Landing Zones, Battle Positions, Ranges, and Grassland Sites.



Graph 3-4b Average Bird Species Richness at Landing Zones, Battle Positions, Ranges, and Grassland Sites (excluding one landing zone site).



The second study, a bird survey route, was conducted throughout the training area to determine differences in bird species richness in a variety of military training areas and habitat types. The routes consisted of thirty-nine sites that were each visited three times to reduce the likelihood of species being undetected. Graph 3-4c displays the average species richness for each type of training area and habitat type surveyed. Average species richness was greatest in dig sites, ranges and landing zones, which are all fairly open sites. Bivouac sites and land navigation sites are typically surrounded by pitch pine oak forest and tend to have a similar number of species. Although land navigation sites had the lowest average species richness, they were not significantly different from pitch pine oak forest sites. Figure 3-7 shows the locations of the bird survey route sites surveyed during TY 2012.

Graph 3-4c. Average Species Richness from Bird Route Surveys.

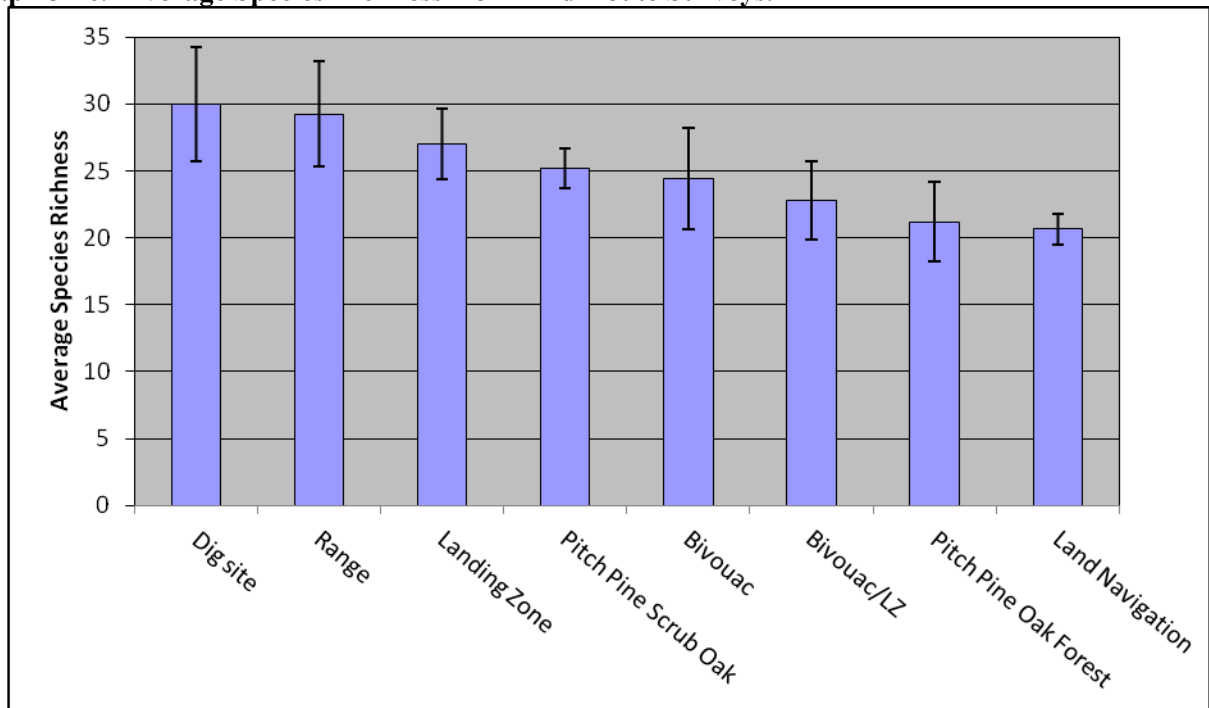
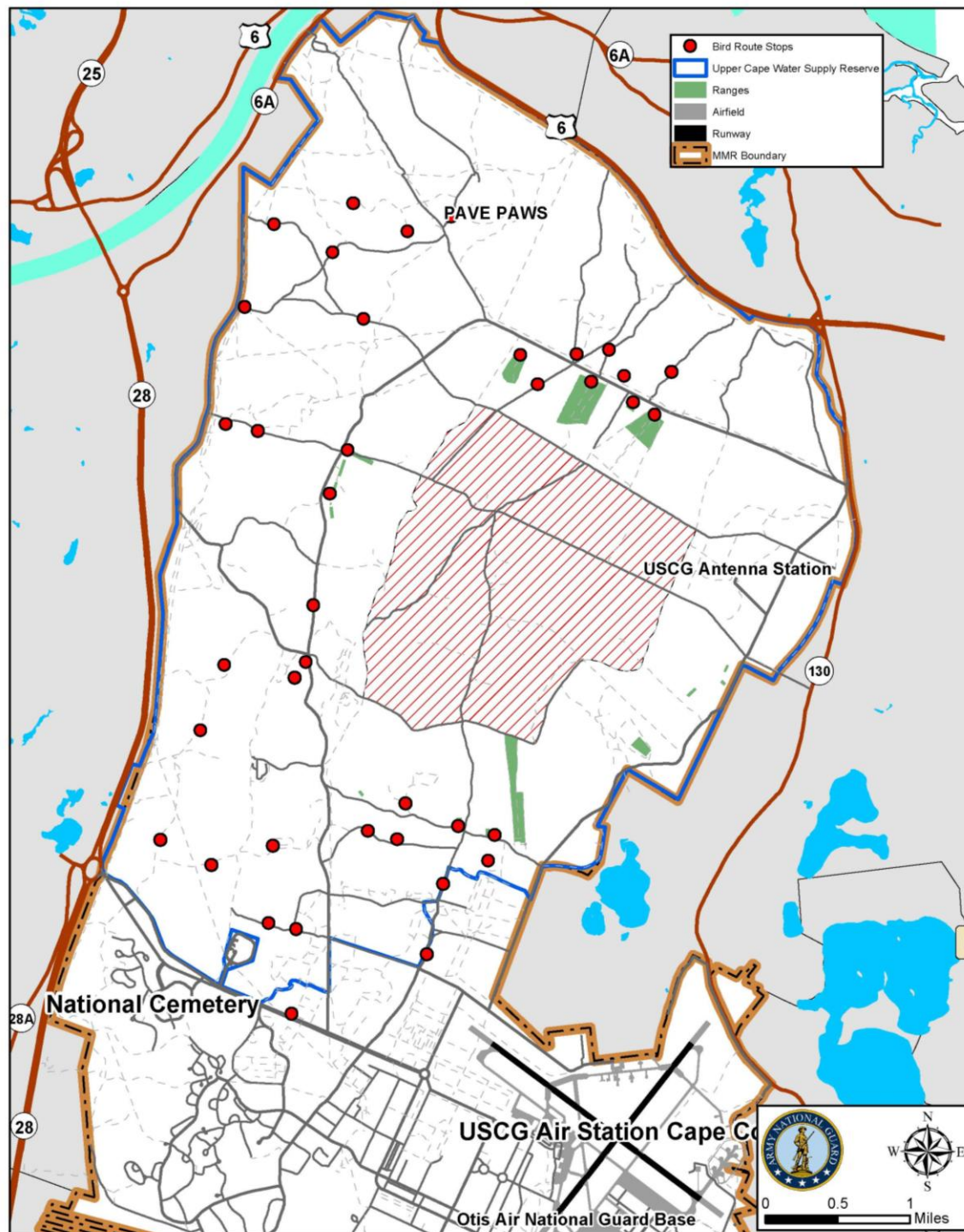


Figure 3-7 Bird Survey Route Sites Surveyed During TY 2012



3.7.4 Rare Species Reporting

The Natural Resource Office reports the number of rare bird and mammal occurrences to NHESP every year. Information submitted for TY 2012 is included in Table 3-2 in Section 3.3.2.

3.7.5 Deer Hunt

There was a deer hunting season in the Reserve during TY 2012 in which fifty-four deer were taken. This included a four-day archery season (November 16–19, 2011), a six-day shotgun season (December 5–10, 2011), a three-day primitive (muzzleloader) season (December 15–17, 2011), and a three-day hunt for paraplegic sportsmen (November 3–5, 2011). Table 3-6 provides information on the deer hunts conducted at Camp Edwards since TY 2002.

TABLE 3-6 DEER HARVEST DATA FOR CAMP EDWARDS HISTORY						
Training Year	Hunter Days	Bucks	Does	Sex Ratio	Total	Deer/Hunter Ratio
2012	1,242	30	24	1.3	54	0.04
2011	1,296	40	25	1.6	65	0.05
2010	1,090	39	18	2.2	57	0.05
2009	1,155	29	22	1.3	51	0.04
2008	1,315	29	16	1.8	45	0.03
2007	1,563	39	43	0.9	82	0.05
2006	1,582	38	37	1.0	75	0.05
2005	1,658	49	56	0.9	105	0.05
2004	1,658	49	56	0.9	105	0.06
2003	1,291	79	50	1.6	129	0.10
2002	1,272	105	64	1.6	169	0.19

Note: Hunter Days is the sum of the number of hunters each day for each day of the annual hunt.

3.7.6 Wild Turkey Hunt

There was a five-day wild turkey hunting season in the Reserve from May 21 - May 25, 2012 during which hunters took five turkeys. In addition, a one-day youth turkey hunt was held on April 28, 2012 in which eighteen youths participated with five turkeys taken. Table 3-7 provides information on the wild turkey hunts conducted in the spring since TY 2002.

TABLE 3-7 TURKEY HARVEST DATA FOR CAMP EDWARDS HISTORY			
Training Year	Hunter Days	Turkeys Taken	Turkey / Hunter Ratio
2012	96	10	0.10
2011	178	11	0.06
2010	118	14	0.12
2009	121	12	0.10
2008	78	6	0.08
2007	51	1	0.02

TABLE 3-7 (Cont'd)
TURKEY HARVEST DATA FOR CAMP EDWARDS
HISTORY

Training Year	Hunter Days	Turkeys Taken	Turkey / Hunter Ratio
2006	90	4	0.04
2005	44	1	0.02
2004	105	4	0.04
2003	-	-	-
2002	-	-	-

Notes: 1. There were no turkey harvests in TY 2002 and TY 2003.
2. Hunter Days is the sum of the number of hunters each day for each day of the annual hunt.

3.8 AIR QUALITY MANAGEMENT

3.8.1 Program Activities and EPS Compliance

Following is a summary of activity compliance with the Air Quality Management Performance Standard for TY 2012:

- There was no change in TY 2012 in the number of facilities with stationary source emissions operated by the MAARNG in the Reserve.
- During TY 2012, air sampling was not required in the Reserve by EPA, MassDEP or Army regulation as part of air quality management of military training activities performed during the training year. Based on current military activities and regulatory requirements, the MAARNG does not anticipate having to conduct air sampling in the foreseeable future.

3.8.2 Air Quality Permits

Potential air emissions from stationary sources at Camp Edwards are below the established federal and state thresholds for the designated primary air pollutants (carbon monoxide, nitrogen oxide, particulate matter, sulfur dioxide, and volatile organic compounds). Thus, Camp Edwards does not require an air quality control permit for stationary source emissions under the provisions of the Clean Air Act (CAA), nor is Camp Edwards required to measure and report actual emissions from its stationary sources. However, the prescribed burn program requires an air quality control permit.

The MAARNG received a letter from MassDEP dated January 1, 2012 extending the permit it had previously issued for the purpose of conducting prescribed burn activities on Camp Edwards, with the terms and conditions remaining identical to the previous permit issued on January 1, 2011. Accordingly, the permit allows the MAARNG to conduct prescribed burning activities for the period January 1, 2012 through June 30, 2012 and from September 16, 2012 through December 31, 2012. In addition, the permit authorizes prescribed burning of up to twenty acres per burn event for research purposes for the period July 1, 2012 through September 15, 2012.

3.8.3 Air Quality Reports

310 CMR 7.00 requires that any person having control of a fuel burning facility or facilities with a total rated input capacity in excess of 10,000,000 Btu/hr of natural gas register certain information with MassDEP and submit required reports to it. Because of the number of facilities it has on Camp Edwards,

the MAARNG is required to submit a Source Registration/Emissions Statement (SR/ES) report for Camp Edwards to MassDEP every three years or as otherwise required by MassDEP. The last report for Camp Edwards was submitted in May 2012 for calendar year 2011. The next report will be submitted in calendar year 2015 with calendar year 2014 information. The only MAARNG stationary source emissions locations in the Reserve on Camp Edwards are Range Control and the Ammunition Supply Point.

As required by the air quality permit authorizing the prescribed burn program at Camp Edwards, the MAARNG submitted a report to MassDEP providing a summary of the fire management activities conducted at Camp Edwards in calendar year 2011. Information on prescribed burn activity for TY 2012 is provided in Section 3.11.2 of this report.

3.9 NOISE MANAGEMENT

3.9.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Noise Management Performance Standard during TY 2012:

- No noise complaints were filed with Range Control concerning firing of ammunition in the Reserve during TY 2012.
- No noise complaints were filed with Range Control or the Army Aviation Facility concerning helicopter activity in the Reserve during TY 2012.

3.9.2 Operational Noise Management Plan

The MAARNG published a Statewide Operational Noise Management Plan in December 2007 that provides a strategy for noise management at MAARNG facilities, including Camp Edwards. The plan includes a description of noise environments, including levels from small arms and aircraft training activities. Elements of the plan include education, complaint management, possible noise and vibration mitigation, noise abatement procedures, and land use management. Specific procedures are provided for noise complaints and protocols are provided for providing public notification for blowing up unexploded ordnance in place and for other unusual noise events.

3.10 PEST MANAGEMENT

3.10.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Pest Management Performance Standard during TY 2012:

- There was no outside contracting by the MAARNG for pest management services in the Reserve during TY 2012.
- 8,578 invasive plant stems were removed. (See Table 3-5 in Section 3.6.2)
- Only approved herbicide formulations are used in the Reserve. (There were none used by the MAARNG in the Reserve in TY 2012.)

- There were no aerial applications of pesticides or herbicides in the Reserve.

3.11 FIRE MANAGEMENT

3.11.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Fire Management Performance Standard during TY 2012:

- The MAARNG conducted one prescribed burn in the Reserve in TY 2012.
- An annual report on the prescribed burns conducted during calendar year 2011 was submitted to MassDEP on November 28, 2011 as required by the Air Quality Permit.
- The MAARNG received a new prescribed burn permit from MassDEP dated January 1, 2012.

3.11.2 Prescribed Burn Program

The Natural Resource Office utilizes a prescribed burn program to manage habitat, reduce fuel loads and help prevent wildfires. The program is outlined in the Camp Edwards Fire Management Plan which is available on the E&RC's website: www.EandRC.org. The program is authorized by the provisions of an air quality permit issued by MassDEP. The MAARNG received a new prescribed burn permit from MassDEP dated January 1, 2012. (See Section 3.8.2)

A prescribed burn of fifty acres was conducted on October 25, 2011 in the Northwest Unit area. Prescribed burns scheduled for April 27, 2012, May 21, 2012 and June 18, 2012 were cancelled because weather conditions exceeded permit provisions or because of other unfavorable burn conditions.

Table 3-8 provides a history of the prescribed burn program at Camp Edwards since TY 2002. The decrease in the number of burns/acres burned in the past three years (TY 2010 – TY 2012) was primarily due to unfavorable weather conditions, unsatisfactory MassDEP Air Quality Indices, and subsequent difficulties in arranging necessary logistical requirements with organizations outside the MAARNG (manpower and equipment) to reschedule burns.

TABLE 3-8 PRESCRIBED BURN ACTIVITIES IN THE RESERVE HISTORY		
Year	Number of Burns	Acres Burned
TY 2012	1	50
TY 2011	0	0
TY 2010	2	31
TY 2009	3	84
TY 2008	4	67
TY 2007	3	29
TY 2006	4	94
TY 2005	4	249
TY 2004	6	672
TY 2003	3	230
TY 2002	0	0

3.11.3 Fire Management Training

The Natural Resource Office sponsored two wildland fire training courses at Camp Edwards during TY 2012. Twenty persons attended a Fire Fighter Training/Introduction to Wildland Fire Behavior/Human Factors on the Fireline course. Fifteen persons attended a Wildland Fire Chainsaw course. Participants included members of the MAARNG, the MMR Fire Department, National Park Service, Albany Pinebush Commission, DCR, Trustees of Reservations, The Nature Conservancy, Fish and Wildlife Service, and the U.S. Forest Service.

3.12 STORMWATER MANAGEMENT

3.12.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Stormwater Management Performance Standard during TY 2012:

- There were no new stormwater runoff increases in the Reserve due to military training activities.
- No new stormwater discharges from military training activities were made directly into wetland resource areas in the Reserve.

3.13 WASTEWATER MANAGEMENT

3.13.1 Program Activities and EPS Compliance

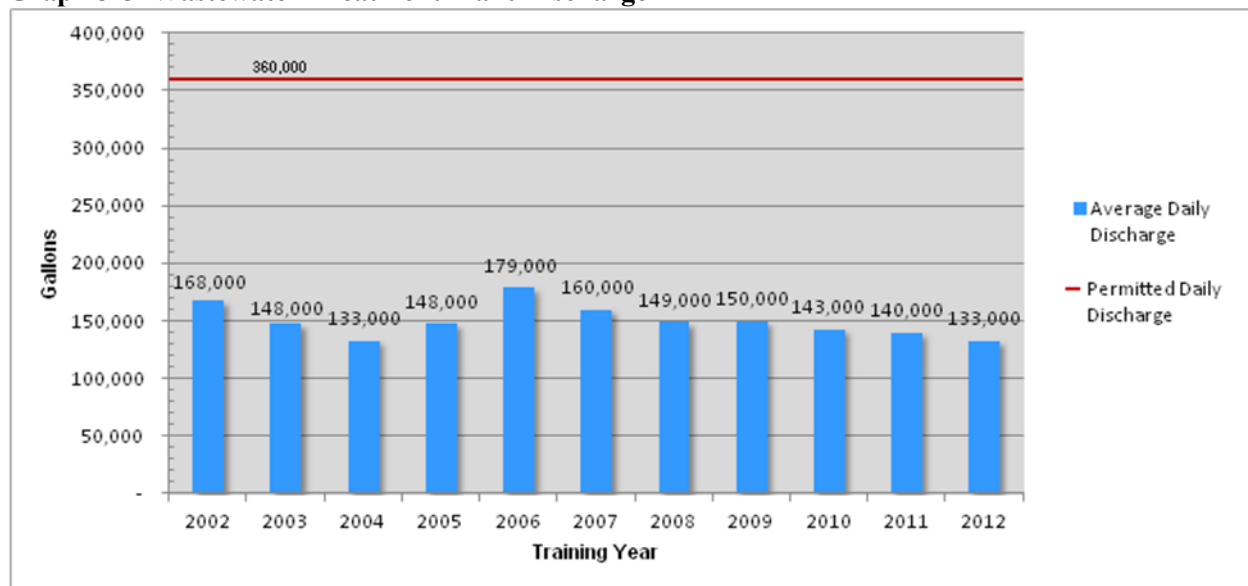
Following is a summary of activity regarding MAARNG compliance with the Wastewater Management Performance Standard at its MAARNG facilities in the Reserve during TY 2012:

- Depending on the location of facilities, wastewater and sewage from MAARNG training activities in the Reserve was either pumped from portable toilet facilities and hauled off base for disposal at licensed disposal facilities or discharged through existing septic systems at Range Control and the Ammunition Supply Point. (Note: There is also a septic system at the privately operated Otis Fish & Game Club located on Camp Edwards in the southwestern corner of the Reserve.)
- The Otis ANGB wastewater treatment plant operated within the discharge volume limits of its wastewater discharge permit into its sand filtration beds located in the Reserve.

3.13.2 Wastewater Treatment Plant Discharge

The Otis ANGB wastewater treatment plant discharged 48,583,000 of sewage into the sand filtration beds in the Reserve in TY 2012; a daily average of 133,000 gallons versus its permitted twelve-month moving average flow of 360,000 gallons. Graph 3-5 shows the daily average pumping rate of the Otis system since TY 2002.

Graph 3-5 Wastewater Treatment Plant Discharge



3.14 SOLID WASTE MANAGEMENT

3.14.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Solid Waste Management Performance Standard during TY 2012:

- The Camp Edwards Ammunition Supply Point did not turn in any ammunition casings for recycling to the Defense Logistics Agency office in Groton, Connecticut, during TY 2012.
- The MAARNG published a Statewide Integrated Solid Waste Management Plan for all of its Army National Guard facilities in August 2010. The plan establishes MAARNG policy, responsibilities, goals, and objectives for compliance with statutory requirements for waste minimization, recycling and solid waste disposal. Chapter 8 of the plan includes solid waste management procedures specific to Camp Edwards, as well as identifying potential future solid waste management alternatives.

3.15 HAZARDOUS MATERIALS MANAGEMENT

3.15.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Hazardous Materials Performance Standard during TY 2012:

- The MAARNG's two permanently occupied facilities in the Reserve (Range Control and the Ammunition Supply Point) use propane as their heating source, thus there was no storage of heating oil during the year.
- The Otis Fish & Game Club facility in the Reserve uses propane as its heating source, thus there is no storage of heating oil at the facility.

- The MAARNG complied with its policy of not performing maintenance activities on military vehicles in the Reserve throughout TY 2012. Thus, hazardous materials normally associated with vehicle maintenance and repair facilities were not stored in the Reserve.
- There were no above-ground or below-ground fuel storage tanks installed in the Reserve by the MAARNG during TY 2012.
- There are no known underground fuel storage tanks in the Reserve in areas controlled or operated by the MAARNG.
- The IAGWSP does not use liquid fuel at any of its treatment facilities in the Reserve, thus there is no storage of liquid fuel at its facilities.
- During TY 2012, there were no hazardous material spills in the Reserve which required reporting to MassDEP under the provisions of the Massachusetts Contingency Plan (MCP), 310 CMR.
- There were seven small spills in the Reserve during TY 2012 below the reporting levels established in the MCP:
 1. Less than one quart of oil leaked from a military vehicle onto an asphalt parking lot in Training Area BA 4, across the street from Range Control on April 19, 2012.
 2. Approximately one pint of power steering fluid leaked from a military vehicle onto the asphalt parking lot at Kilo Range on May 6, 2012.
 3. Less than one quart of anti-freeze leaked onto the asphalt parking lot at Range Control from a military vehicle on June 6, 2012.
 4. Approximately two gallons of hydraulic fluid leaked from a bobcat operated by Range Control at Alpha Range on July 13, 2012. (Note: It was initially thought that ten gallons were spilled and notification was made to MassDEP. However, subsequent investigation indicated that at most seven gallons leaked, of which a maximum of two gallons actually was spilled on the dirt. Accordingly, the notification to MassDEP was withdrawn.)
 5. Less than one pint of oil leaked from a vehicle onto the asphalt parking area on Kilo Range on August 5, 2012.
 6. Approximately one gallon of oil leaked from a riding lawnmower parked on the grass immediately adjacent to the Otis Fish & Game Club facility on or about August 6, 2012.
 7. Approximately four to five gallons of hydraulic fluid leaked from a broken hydraulic line on a military grader working on Canal View Road in the B 8 training area on September 16, 2012.

These seven spills were cleaned up with any contaminated soil or cleanup materials disposed of in accordance with applicable federal and state environmental regulations.

3.16 HAZARDOUS WASTE MANAGEMENT

3.16.1 Program Activities and EPS Compliance

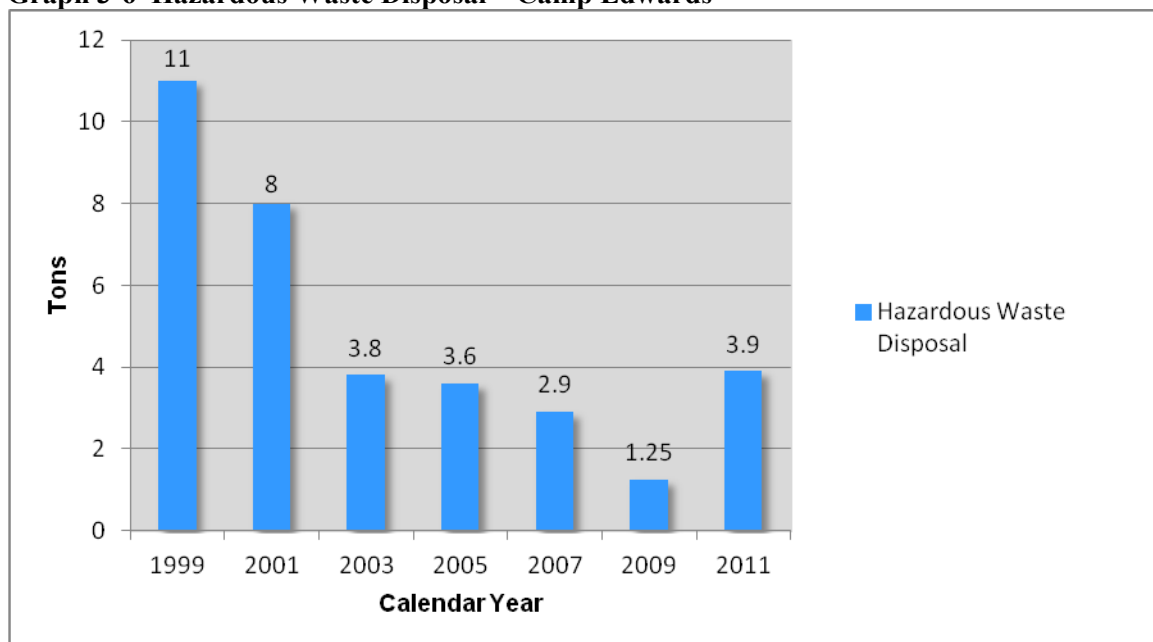
Following is a summary of activity regarding MAARNG compliance with the Hazardous Waste Performance Standard during TY 2012:

- The MAARNG complied with its policy of not performing maintenance activities on military vehicles in the Reserve throughout the year. Thus, hazardous wastes normally associated with vehicle maintenance and repair facilities were not generated or stored in the Reserve.
- In instances where the IRP or IAGWSP use the EPA identification number of the MAARNG to dispose of wastes generated by remediation activities in the Reserve, the E&RC tracks the procedure to ensure compliance with applicable regulations.

3.16.2 Hazardous Waste Disposal and Reporting

A Biennial Hazardous Waste Report must be prepared and submitted to EPA and MassDEP in March of even-numbered years reporting on hazardous waste generated by large quantity generators (LGQ) during the preceding odd-numbered year. In accordance with Massachusetts regulations, the MAARNG submitted a letter to MassDEP indicating that Camp Edwards did not generate LGQ quantities of waste in any month of calendar year 2011, therefore not requiring the submittal of a Biennial Report. A total of 3.9 tons of hazardous waste was disposed of consisting mainly of the following two federally regulated hazardous waste streams: waste flammable liquids (JP-8 fuel) and waste flammable solids (rags and clean-up material containing JP-8). This material is stored in the hazardous waste temporary storage facility in the Cantonment Area prior to being transported off the installation. The increase in calendar year 2011 is attributed to fewer deployments and higher turn-in of outdated military equipment. Graph 3-6 provides information on the volumes of hazardous waste disposal reported for the past seven biennial reports.

Graph 3-6 Hazardous Waste Disposal – Camp Edwards



3.17 VEHICLE MANAGEMENT

3.17.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Vehicle Management Performance Standard during TY 2012:

- Civilian use of the roads in the Reserve during the year, other than unauthorized All Terrain Vehicles (ATVs) and dirt bikes, was associated with groundwater investigation and remediation activities, with construction projects at the ranges, use of the training areas and during deer and turkey hunts.

3.18 GENERAL USE AND ACCESS MANAGEMENT

3.18.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the General Use and Access Management Performance Standard during TY 2012:

- The Natural Resource Office hosted three grassland bird tours in the grasslands of Camp Edwards in 2012 on June 16, June 27 and July 14 with approximately fifteen to twenty individuals per tour. The tours were conducted as part of the Sustainable Range Awareness program, a component within the ITAM program. The Sustainable Range Awareness program serves to educate the public on the success of natural resource management taking place on Camp Edwards in support of the military mission. There was also a whip-poor-will tour in the Reserve on May 16, 2012 for members of the Cape Cod Bird Club.

3.19 SMALL ARMS RANGE MANAGEMENT

3.19.1 Program Activities and EPS Compliance

Section 2 of this report provides an update on small arms range activities associated with firing of ammunition on the Camp Edwards ranges during TY 2012.

3.20 CULTURAL RESOURCES MANAGEMENT

3.20.1 Program Activities and EPS Compliance

Following is a summary of activity regarding MAARNG compliance with the Cultural Resources Management Performance Standard during TY 2012:

- The Natural Resource Office reviewed nine RECs for projects associated to the Reserve during TY 2012 to ensure that appropriate cultural resources requirements were followed.
- Required consultations with federally recognized tribes and the State Historic Preservation Officer (SHPO) are completed in advance of any MAARNG and IAGWSP program undertakings for any actions in areas designated as High or Moderate Sensitivity.

3.21 EPS VIOLATIONS HISTORY

There was one EPS violation during TY 2012, a violation of the Small Arms Range EPS 19 issued by the EMC on November 7, 2011. Table 3-9 provides an explanation of any violations reported since TY 2002.

TABLE 3-9 EPS VIOLATIONS HISTORY			
TRAINING YEAR	REPORTED VIOLATION	EXPLANATION OF VIOLATION	CORRECTIVE ACTION
TY 2012	Small Arms Range EPS (EPS 19)	On November 7, 2011, the EMC issued a notice for failure to remove water from bullet traps on all three active small arms ranges within the prescribed time periods on multiple occasions during TY 2011.	The MAARNG submitted a Response Packet to the EMC in early December 2011 which included: 1) a Notification Protocol should it not be able to comply with a requirement of the OMMPs; 2) a STAPP Range Tarp Cover Project Description; 3) Water Removal Contracting and Budgeting provisions; 4) creation of a Camp Edwards Sustainable Range Program Working Group; and 5) a Standard Operating Procedure for STAPP System Range Maintenance Procedures and Inspections.
TY 2011	Wetlands & Surface Water EPS (EPS 2) & General Use and Access EPS (EPS 18)	On May 17, 2011 military vehicles (humvees) were driven into an off limits area within 100 feet of Donnelly Pond in the B 8 Training Area. On the same date, humvees were driven on a seasonably restricted road in the B 8 Training Area.	The using unit notified Range Control and the EMC's Environmental Officer, who was present at Range Control when the using unit reported the violation. The MAARNG reestablished the seasonal road closure and closing of unauthorized access points in the B 8 Training Area, revisited all seasonal road closure areas to ensure road blocks and proper signage was in place, and conducted a debriefing by Range Control of the involved unit.
TY 2010	None	-----	-----
TY 2009	Small Arms Range EPS (EPS 19)	On November 17, 2008 a contractor conducting maintenance on the STAPP system at Tango Range did not use secondary containment or take other steps to prevent a release of contaminated media to the environment.	The MAARNG ordered the contractor to shut down its operations and the MAARNG conducted response actions to remove contaminated debris and soil. In addition, the MAARNG completed the following four additional actions required by the Notice of Noncompliance: 1. Scheduled and attended a follow-up meeting to discuss steps to avoid future incidents of this type. 2. Made revisions to the Tango, Juliet & Kilo Range OMMP plans to prevent similar releases and non-compliance. 3. Conducted confirmatory soil sampling to document that the release of metals was fully addressed. 4. Provided documentation of appropriate management and disposition of contaminated soil and debris.

**TABLE 3-9 (Cont'd)
EPS VIOLATIONS
HISTORY**

TRAINING YEAR	REPORTED VIOLATION	EXPLANATION OF VIOLATION	CORRECTIVE ACTION
TY 2008	Wetlands and Surface Water EPS (EPS 2)	Part of the old M Range training area and associated road network near Bypass Bog were not restricted on April 5 th and 6 th , 2008, thus allowing a unit to use vehicles within 500 feet of the wetland during the restricted March 1 – June 15 timeframe.	The site was assessed for long-term training needs, and an appropriate update was made to the range packet to ensure positive management of the site.
TY 2007	None	-----	-----
TY 2006	General Performance Standard	An Army Reserve unit training on Camp Edwards fired approximately 2,000 rounds of lead ammunition on J Range during a training weekend on October 15 – 16, 2005.	Implemented four new procedures: 1. Units must provide a copy of their ammunition request to Range Control prior to firing so that Range Control can track what ammunition has been drawn from the Ammunition Supply Point. If lead ammunition is on the request form, Range Control will not let them fire on an outdoor range. 2. Units can not draw lead ammunition from the Ammunition Supply Point unless they have a confirmation letter that the Coast Guard indoor range facility is reserved for their use. 3. A statement was added in the Range Packet – non-lead ammunition only. 4. Signs were posted at all outdoor ranges indicating “no lead firing.” (Note: This procedure has been modified to accommodate the firing of lead ammunition at Tango Range that was approved by the EPA and EMC in July 2007.)
TY 2005	Wetlands EPS (EPS 2)	Positive controls to ensure certain roads were closed to vehicle traffic during the March 1 – June 15 timeframe were not in place until late March or early April.	The MAARNG placed road barriers with signage, closed existing gates, and strung chains across roads accordingly.
TY 2005	Rare Species EPS (EPS 3)	Work commenced on a project, after the project had been revised, to upgrade the Sierra East / Sierra West (SE/SW) ranges without the required notification, review and approval of the project by the Massachusetts NHESP.	The MAARNG halted the work, completed a revised environmental review, and a project filing was submitted to NHESP for review. NHESP subsequently approved the project with several conditions.
TY 2004	None	-----	-----
TY 2003	None	-----	-----
TY 2002	None	-----	-----

3.22 MITIGATION

3.22.1 Fire Management

The MAARNG utilizes prescribed burns in the training areas to maintain habitat and to mitigate the potential for catastrophic wildfires that could occur within the Reserve. Section 3.11.2 of this report provides information on prescribed burn activities conducted by the MAARNG in the Reserve since TY 2002.

3.22.2 Grasslands Restoration (Otis ANGB)

One of the requirements levied by the Secretary of the Executive Office of Environmental Affairs' July 16, 2001 Certificate approving the MMR Master Plan was a commitment by the MAANG to develop and implement a Grasslands Management Plan for MAANG property on Otis ANGB in the Cantonment Area. The plan was published in August 2002 and over the past few years the MAANG has completed several projects removing trees and restoring approximately 35 acres of grasslands on its property in the grassland management area section of the Cantonment Area, the area which the MAANG indicated it would initiate efforts to restore. The projects were completed in the area along Richardson Road between Generals Boulevard and West Inner Road. Figure 3-8 identifies the general grassland management area of Otis ANGB in the Cantonment Area.

Questions concerning grasslands on Otis ANGB should be addressed to the point of contact for the 102nd Intelligence Wing listed in Appendix B.

3.23 GOVERNING ENVIRONMENTAL LAWS AND REGULATIONS

MAARNG activities in the Reserve are governed by numerous federal, state, DoD, and U.S. Army laws and regulations. Table 3-10 identifies these governing directives as they apply to the various Camp Edwards environmental management programs and Environmental Performance Standards.

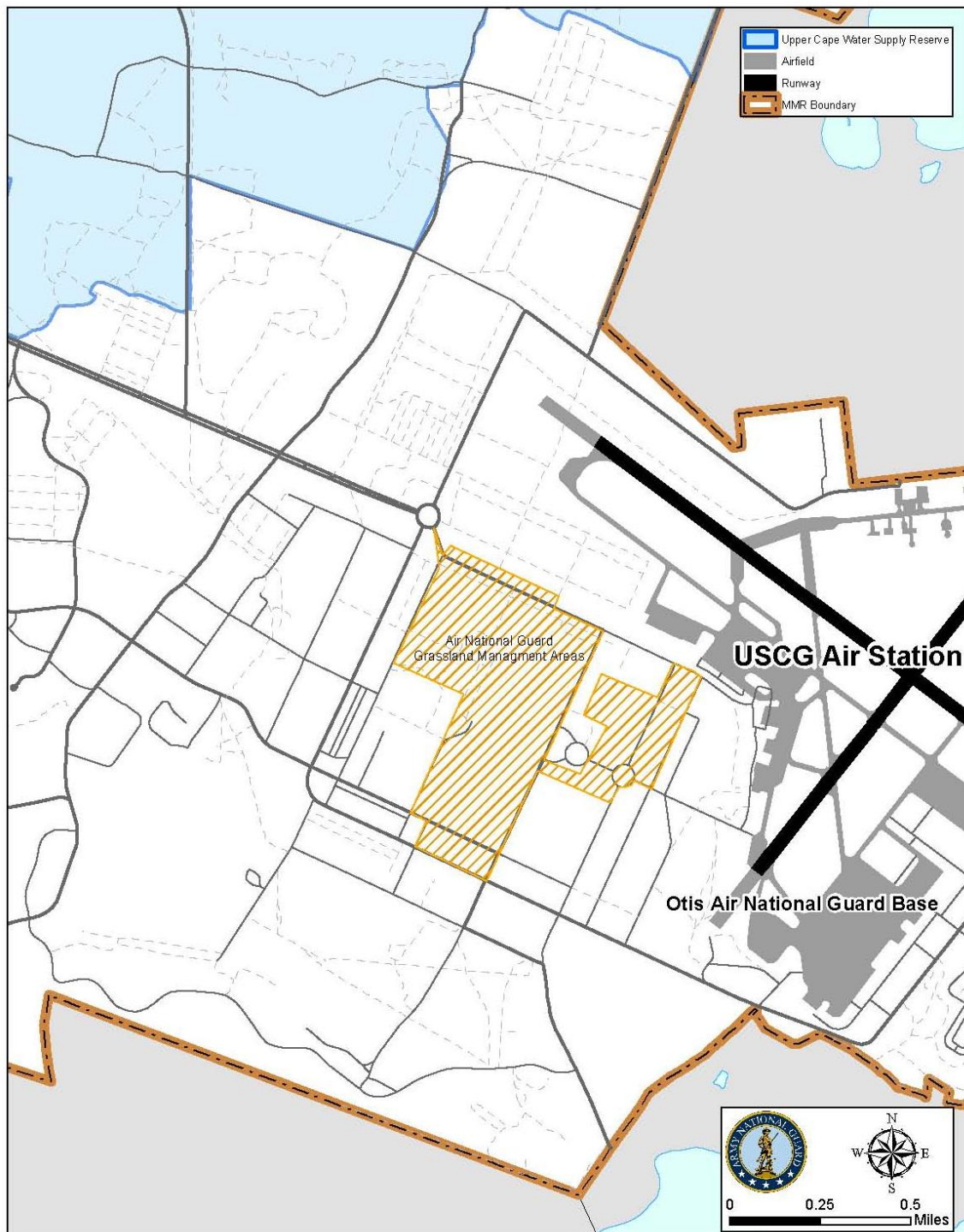
TABLE 3-10 ENVIRONMENTAL LAWS AND REGULATIONS GOVERNING MAARNG ACTIVITIES IN THE RESERVE			
Reserve EPS	Federal Law / Regulation	State Law / Regulation	DoD Regulation *
Groundwater Resources	Clean Water Act Safe Drinking Water Act	Drinking Water Quality Standards (310 CMR 22.00) State Wellhead Protection (310 CMR 22.21) Water Management Act (310 CMR 36.00)	AR 200-1 AR 200-2 Camp Edwards Regulation (CER) 385-63
Wetlands and Surface Water	Clean Water Act Coastal Zone Management Act Floodplains Management (EO 11988) Protection of Wetlands (EO 11990) Rivers and Harbors Act of 1899 Sikes Act Wetlands Management (EO 11990)	Massachusetts Wetlands Protection Act (M.G.L. c. 131, s40; 310 CMR 100.00)	AR 200-2 CER 385-63

TABLE 3-10 (Cont'd) ENVIRONMENTAL LAWS AND REGULATIONS GOVERNING MAARNG ACTIVITIES IN THE RESERVE			
Reserve EPS	Federal Law / Regulation	State Law / Regulation	DoD Regulation *
Rare Species	Federal Endangered Species Act Sikes Act	Massachusetts Endangered Species Act (M.G.L. c. 131A, 321 CMR 10.00)	AR 200-1 AR 200-2 AR 200-3 CER 385-63
Soil Conservation	Sikes Act Soils and Water Conservation Act Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Vegetation Management	American Indian Religious Freedom Act Environmental Justice (EO 12898) Exotic Organisms (EO 11987) Sikes Act		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Habitat Management	Sikes Act	Massachusetts Endangered Species Act (M.G.L. c. 131A, 321 CMR 10.00)	AR 200-1 AR 200-2 AR 200-3 CER 385-63
Wildlife Management	Fish and Wildlife Conservation Act Migratory Bird Conservation Act Migratory Bird Treaty Act Sikes Act		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Air Quality	Clean Air Act	State Air Quality Regulations (310 CMR 4.00)	AR 200-1 AR 200-2 CER 385-63
Noise Management	Federal Interagency Committee Land Noise Control Act Occupational Safety & Health Act Use Planning Standards on Urban Noise, Guidelines for Considering Noise in Land Planning and Control (June 1990)		AR 200-1 AR 200-2
Pest Management	Animal Damage Control Act Federal Insecticide, Fungicide, and Rodenticide Act Noxious Weed Act Resource Conservation and Recovery Act Sikes Act Toxic Substances Control Act		DoD 4150.7 AR 200-1 AR 200-2 AR 200-5 AR 420-47
Fire Management	Clean Air Act Sikes Act The National Fire Code Uniform Fire Code	State Air Quality Regulations (310 CMR 4.00)	AR 200-1 AR 200-2 AR 200-3 AR 420-90 CER 385-63
Storm Water Management	Clean Water Act NPDES discharge permitting and limitations	Massachusetts Wetlands Protection Act (M.G.L. c. 131 s.40, 310 CMR 10.00.)	AR 200-1 AR 200-2
Wastewater	Clean Water Act	Title V (310 CMR 15.00)	AR 200-1 CER 385-63

TABLE 3-10 (Cont'd) ENVIRONMENTAL LAWS AND REGULATIONS GOVERNING MAARNG ACTIVITIES IN THE RESERVE			
Reserve EPS	Federal Law / Regulation	State Law / Regulation	DoD Regulation *
Solid Waste	Resource Conservation and Recovery Act Toxic Substances Control Act	State Solid Waste Handling and Disposal (310 CMR 16.00/19.00)	AR 200-1 AR 200-2 AR 420-47 CER 385-63
Hazardous Materials	Asbestos Hazard Emergency Response (40 CFR 763) Federal Insecticide, Fungicide and Rodenticide Act Hazard Communication Standard Program (29 CFR 1910.1200) Lead Contamination Control Act OSHA (29 CFR 1910, 29 USC 91-596) Poison Prevention Packaging Act Toxic Substances Control Act	Hazardous Substances Labeling Law (105 CMR 650.00)	AR 200-1 AR 200-2 CER 385-63
Hazardous Waste	Clean Air Act Clean Water Act Emergency Preparedness and Community Right-To-Know Act Federal Facilities Compliance Act Hazardous Waste Operations and Emergency Response Medical Waste Tracking National Fire Code Oil Pollution Act Pollution Prevention Act Resource Conservation and Recovery Act The National Contingency Plan Underground Storage Tank Program (RCRA, Title I) Uniform Building and Fire Codes Comprehensive Environmental Response, Compensation, and Liability Act	Department of Transportation regulations regarding shipping and transportation, Hazardous Waste Management and Transportation (310 CMR 30.000) Management of Medical Waste (105 CMR 480) Pesticide use (333 CMR 1.00 – 12.00) Solid waste facilities management (310 CMR 16.00/19.00) State right-to-know requirements (105 CMR 670.00) Title V (310 CMR 15.00) Toxic use reduction (310 CMR 5.00) Underground storage tanks standards (527 CMR 4.00 and 9.0) Massachusetts Contingency Plan (310 CMR 40.00)	AR 200-1 AR 200-2 AR 420-47 CER 385-63
Vehicle	Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-2 CER 385-63
General Use And Access	Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-1 AR 200-2 CER 385-63

TABLE 3-10 (Cont'd) ENVIRONMENTAL LAWS AND REGULATIONS GOVERNING MAARNG ACTIVITIES IN THE RESERVE			
Reserve EPS	Federal Law / Regulation	State Law / Regulation	DoD Regulation *
Cultural Resources (This EPS refers to archeological resources only; the list of regulations cited here has therefore been restricted to those that pertain to protection of archeological resources)	Antiquities Act of 1906 Archeological and Historic Preservation Act of 1974 Archeological Resources Protection Act of 1979 Consultation and Coordination with Indian Tribal Governments (Executive Order 13175) Curation of Federally Owned / Administered Archeological Collections Executive Memorandum of April 19, 1994 – Government-to-Government Relations with American Tribal Governments National Environmental Policy Act of 1966, as amended Native American Graves Protection and Repatriation Act of 1990	Massachusetts General Laws, Chapter 9, sections 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) Massachusetts Environmental Policy Act (MEPA) Massachusetts General Laws Chapter 30, sections 61 through 62H, inclusive (301 CMR 11.00) Massachusetts General Laws, Chapter 38, section 6B: Chapter 9, sections 26A and 27C; Chapter 7, section 38A; Chapter 114, section 17; as amended by Chapter 659 of the Acts of 1983 and Chapter 386 of the Acts of 1989	AR 200-2 AR 200-4 DA PAM 200-4 Office of the Secretary of Defense, Annotated Policy Document for the American Indian and Alaska Native Policy (27 October 1999)
DOD Regulations include all regulations and directives of the Department of Defense, Department of the Army, and National Guard Bureau. AR = Army Regulation DA PAM = Department of Army Pamphlet			

Figure 3-8 Otis ANGB Grasslands Management Area



SECTION 4 MILITARY TRAINING ACTIVITIES

4.0 INTRODUCTION

This section of the Annual Report provides information on levels of military training and range area usage, including usage levels for civilian activities, in these areas in the Reserve (Figure 4-1) during TY 2012. It also includes information on training conducted at the Training Support Areas (TSAs) in the Cantonment Area of Camp Edwards. Overall totals are provided since TY 2002, the year of publication of the first Annual Report. Information is also included in this section on the use of simulated munitions and pyrotechnics in the training areas as required by the EMC letters approving their use. Information is provided on a Notice of Project Change (NPC) filed with the MEPA office in March 2011 involving a Soldier Validation Lane training proposal and its approval by EOEEA, the EMC and EPA Region 1. And, data is provided on the number of rounds of copper ammunition fired, an action approved by federal and state regulators during TY 2012.

4.1 CAMP EDWARDS TRAINING AREA USE

4.1.1 Military and Civilian Use

The MAARNG has approximately 6,375 soldiers who train on average one weekend per month and one two-week cycle during a training year. Units start planning their training several years in advance of the year in which they actually conduct their training. The unit leadership assesses the strengths and limitations of its personnel and begins to schedule training sites and resources to best support the training their units require. During the year prior (TY 2011) to the year of execution (TY 2012) units confirm geographical areas and training sites within those areas.

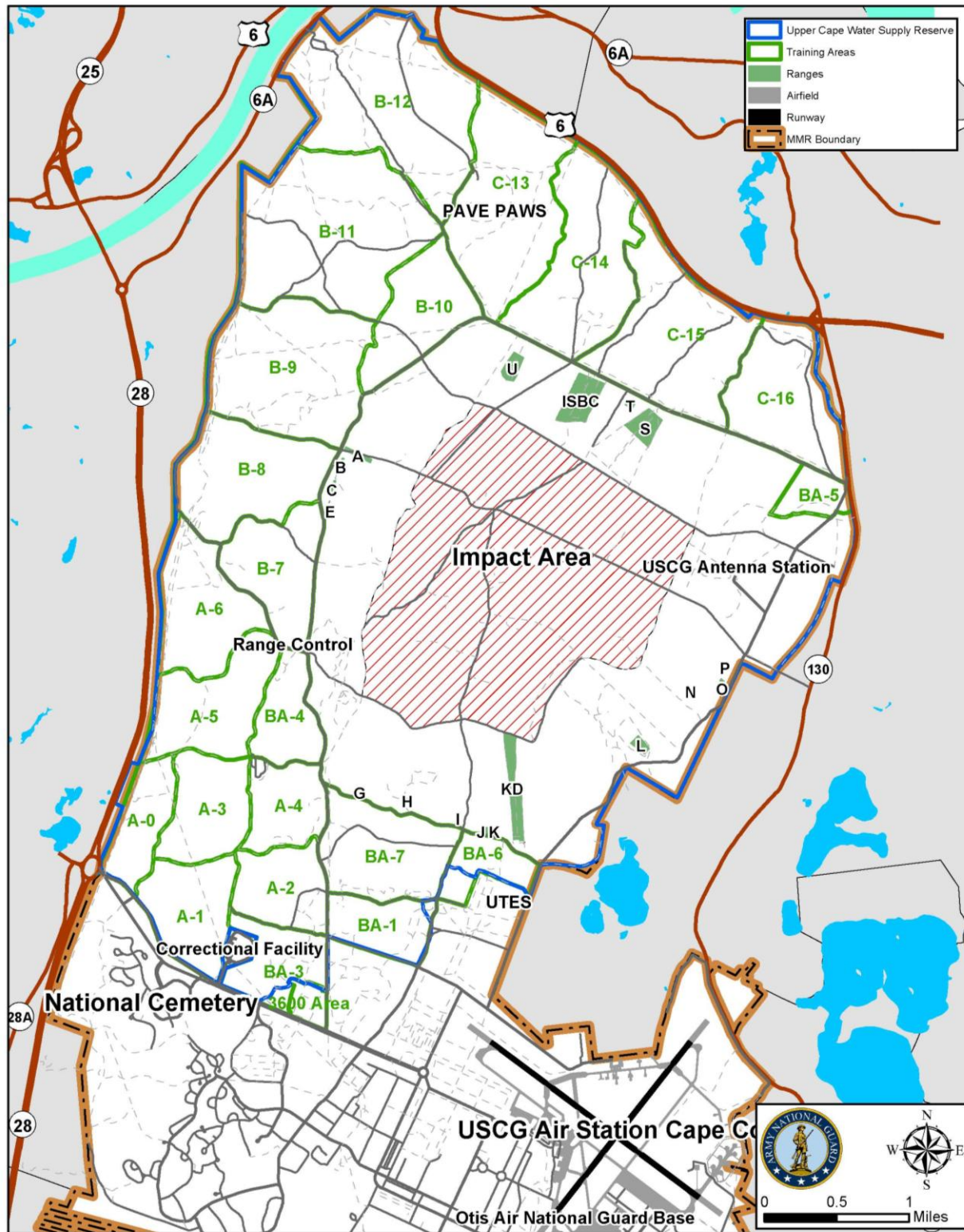
Military training activities in the Reserve are tracked by Range Control based on training events and the number of personnel participating in each training event. This method records the number of times each training area is utilized and the number of personnel and vehicles utilizing the areas for each event. However, this method also artificially inflates numbers as in many cases personnel and vehicles participate in more than one training event per day at different locations. Figure 4-1 shows the locations of the major training areas and firing ranges in the Reserve.

Range Control is operational 24 hours per day when units are training and, during the course of a training day, personnel from Range Control will observe units at various locations to ensure that they are following range safety regulations. The Training Aids Support Center (TASC) monitors and oversees activities within the Training Support Area facilities in the Camp Edwards Cantonment Area.

The following sections provide information on military and civilian use of the ranges, training areas and training support areas during TY 2012. Table 4-1 shows the total utilization of these areas during TY 2012. Table 4-1-A includes information on training use since TY 2002, the year the first Annual Report was published. Figures 4-2-A, 4-2-B, 4-3-A, and 4-3-B show basic visual presentations of the use of the various training areas.

Figures 4-2-A and 4-3-A show color-coded overall usage of the major training areas for each of the eleven individual training years since TY 2002 by the number of training days and events.

Figure 4-1 Camp Edwards Training Area and Ranges



Figures 4-2-B and 4-3-B show color-coded cumulative usage of the training areas by the number of personnel and training day events for the period TY 2002 through TY 2012. These two figures are presented using an “equal interval” classification method which divides the range of possible values into equal-sized intervals, resulting in a more comprehensive and distributed color-coded usage visual display spread throughout the various training areas.

While these figures show the spatial utilization, the numbers used in developing them do not exactly match information presented in Table 4-3-A over the years because some activities listed in Table 4-3-A over the years cannot be designated to a specific training area, such as use of roads for convoy training.

TABLE 4-1 OVERVIEW OF TRAINING USE - TY 2012			
		PERSONNEL	
Area	Training Days / Events	Military Personnel	Civilian Personnel
Ranges	61	2,003	53
Training Areas	232	13,532	122
Training Support Areas	824	63,210	691
TOTAL	1,117	78,745	866

TABLE 4-1-A TRAINING USE HISTORY			
Training Year	Training Days / Events	Military Personnel	Civilian Personnel
TY 2012	1,117	78,745	866
TY 2011	1,232	71,707	819
TY 2010	1,721	156,425	6,945
TY 2009	1,535	116,122	1,324
TY 2008	2,087	113,549	13,137
TY 2007	1,815	41,125	13,997
TY 2006	1,261	36,667	17,211
TY 2005	1,487	139,669	18,038
TY 2004	1,701	133,193	15,208
TY 2003	1,351	89,396	9,309
TY 2002	1,214	70,369	4,492
TOTAL	16,521	1,046,967	101,346

Figure 4-2-A Personnel Totals per Training Area in the Reserve - TY 2002 - TY 2012

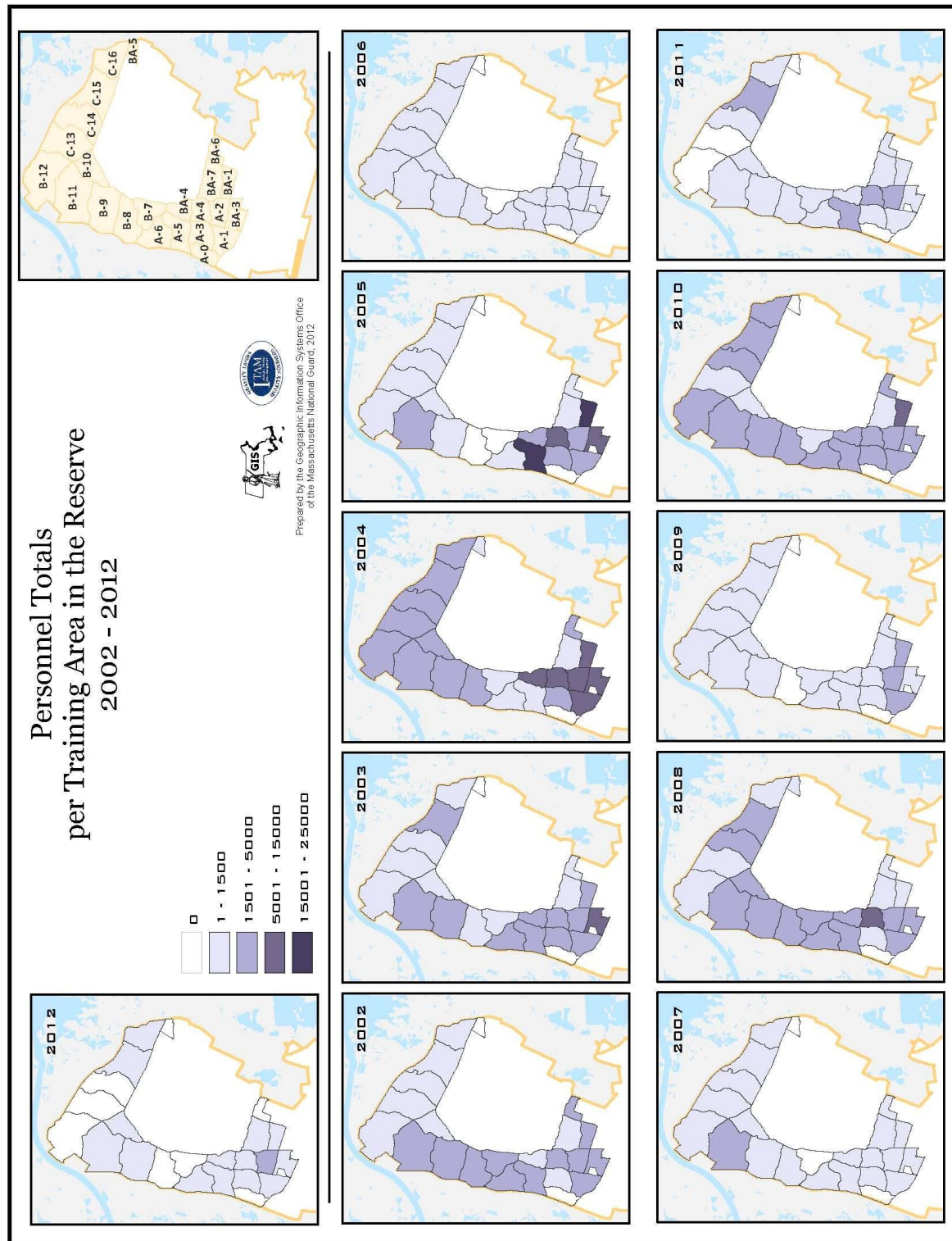


Figure 4-2-B Total Personnel Days per Training Area in the Reserve - TY 2002 - TY 2012

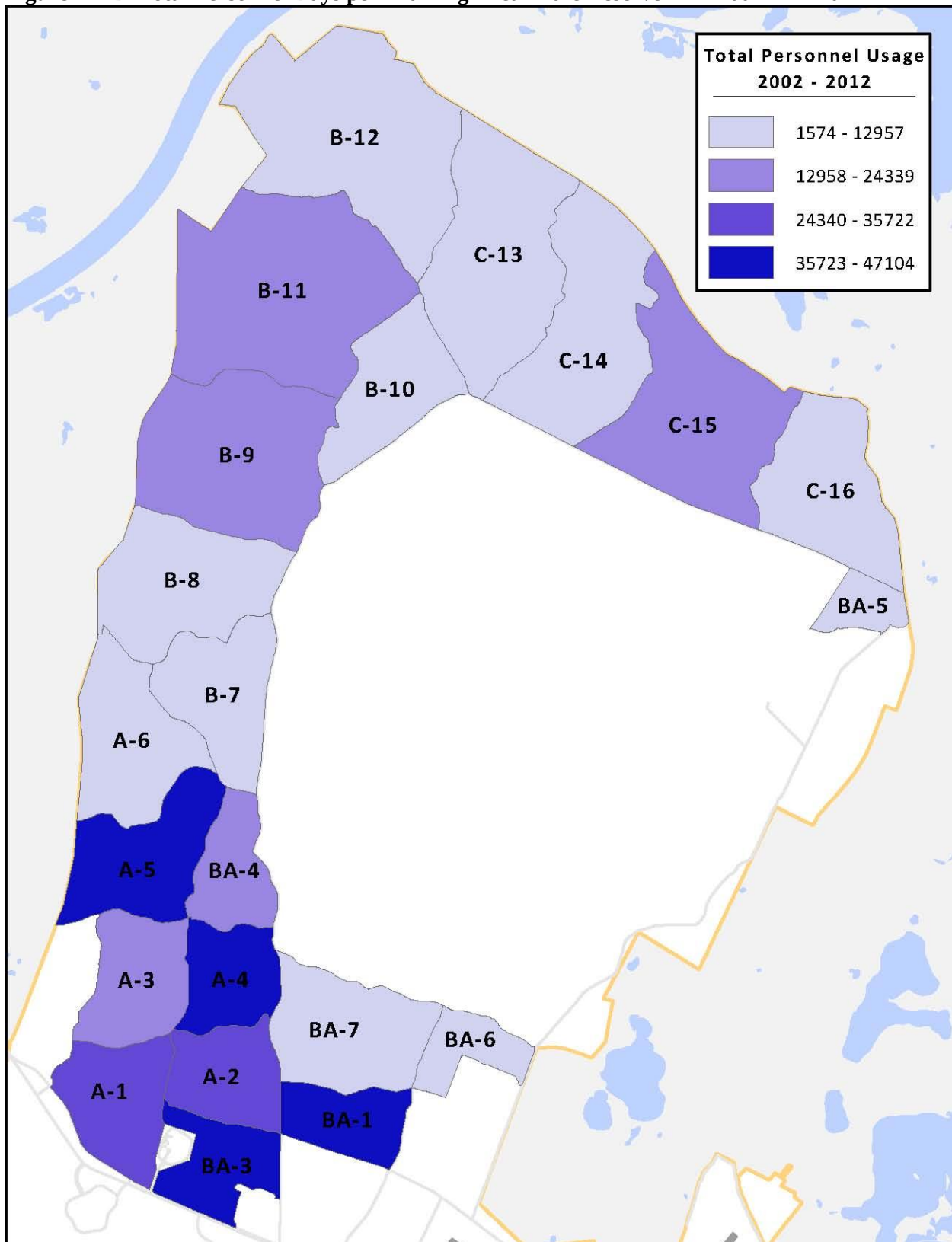


Figure 4-3-A Training Day Totals per Training Area in the Reserve, TY 2002 - TY 2012

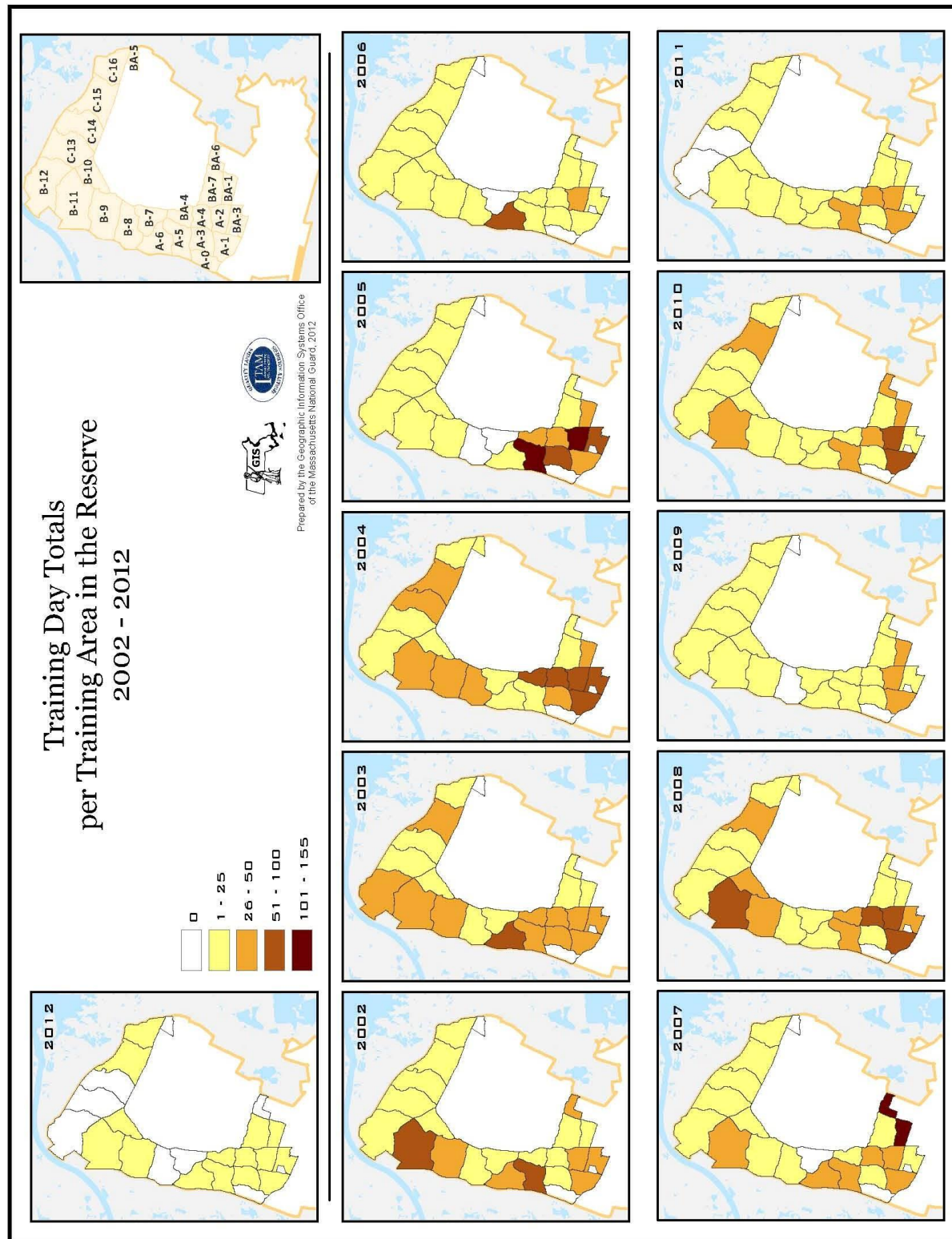
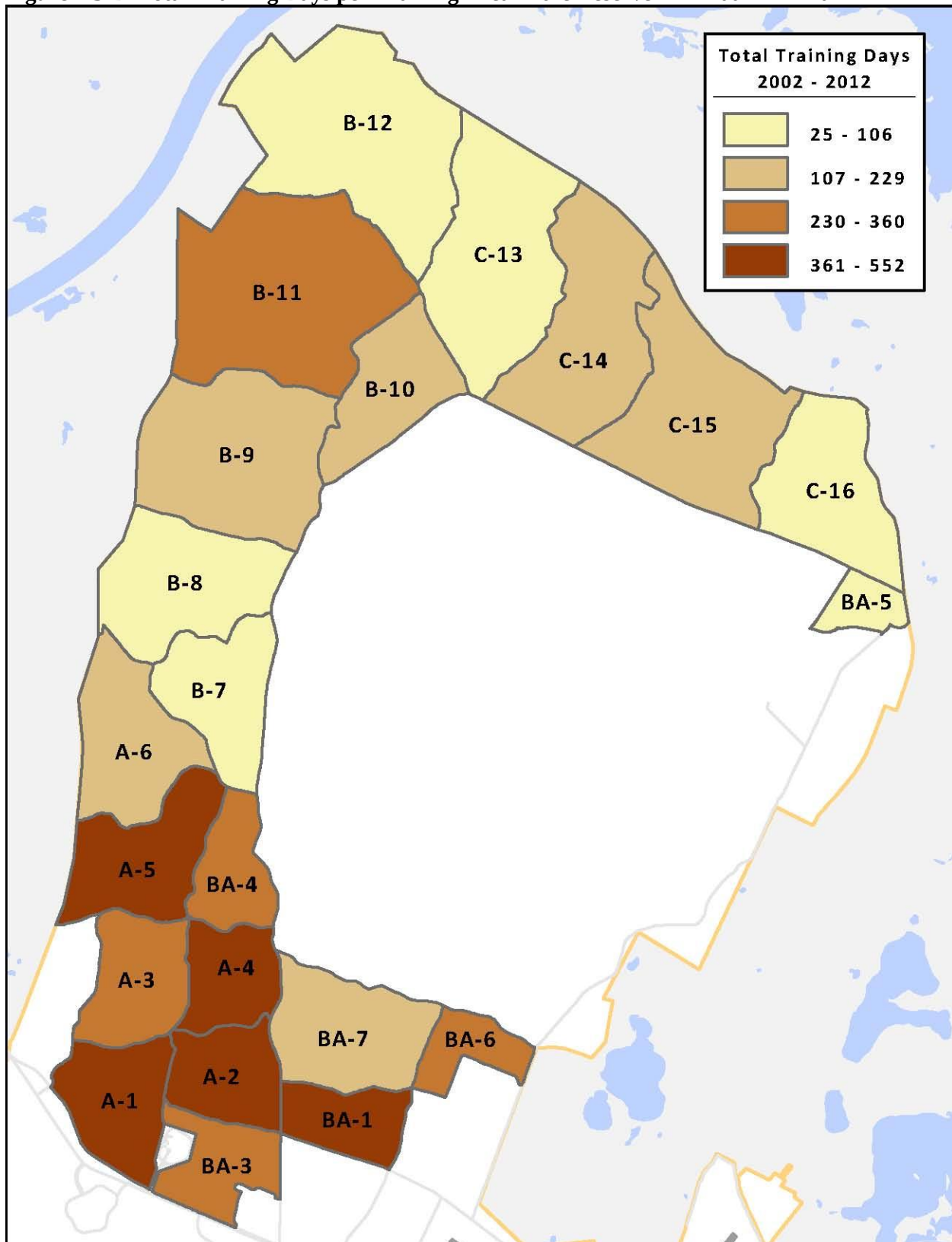


Figure 4-3-B Total Training Days per Training Area in the Reserve - TY 2002 - TY 2012



4.1.1.1 Ranges

Three of the small arms ranges at Camp Edwards were used for weapons firing activity with lead ammunition in TY 2012 (Tango, Juliet and Kilo). Information on firing of lead ammunition in TY 2012, including amounts and types of lead ammunition fired, is provided in Tables 4-2-A, 4-2-B and 4-2-C. Table 4-2-D provides a summary of total lead ammunition fired on Camp Edwards since use of lead ammunition was approved.

Table 4-2-E provides information on the firing of tungsten ammunition during the period TY 2003 through TY 2006. Firing of copper ammunition at Sierra and India ranges was approved during TY 2012, and Table 4-2-F includes information on the number of rounds fired at these two ranges.

During TY 2012, some type of weapons firing was conducted on at least one of the ranges on forty-four calendar days.

Civilian use of the ranges in TY 2012 included the Barnstable County Sheriff's office which fired 3,000 rounds of .233 caliber lead ammunition on Juliet Range and ISA Base Security (Camp Edwards civilian security contractor) which fired 1,300 rounds of 9mm lead ammunition and 250 rounds of .40 caliber ammunition on Juliet Range.

TABLE 4-2-A LEAD AMMUNITION USE HISTORY TANGO RANGE								
Training Year	.40 Cal Lead	9 mm Lead	7.62 mm Lead	5.56 mm Lead	.38 Cal Lead	.45 Cal Lead	.233 Cal Lead	Total
TY 2012	2,800	7,373	0	1,944	0	0	0	12,117
TY 2011	5,200	6,765	0	25,157	0	0	0	37,122
TY 2010	40,341	2,496	0	41,042	0	6,449	0	90,328
TY 2009	0	31,985	0	105,077	300	0	0	137,362
TY 2008	4,075	9,094	4,556	0	0	0	0	17,725
TY 2007	0	0	0	8,547	0	0	0	8,547
TOTAL	52,416	57,713	4,556	181,767	300	6,449	0	303,201
Note: A STAPP bullet capture system was installed at Tango Range in July 2006.								

TABLE 4-2-B LEAD AMMUNITION USE HISTORY JULIET RANGE								
Training Year	.40 Cal Lead	9 mm Lead	7.62 mm Lead	5.56 mm Lead	.38 Cal Lead	.45 Cal Lead	.233 Cal Lead	Total
TY 2012	750	12,819	0	14,457	0	0	3,000	31,026
TY 2011	0	16,911	0	46,630	0	0	0	63,541
TY 2010	0	7,311	0	27,060	0	0	0	34,371
TY 2009	0	4,780	0	11,482	0	0	0	16,262
TY 2008	0	0	0	0	0	0	0	0
TY 2007	0	0	0	0	0	0	0	0
TOTAL	750	41,821	0	99,629	0	0	3,000	145,200
Note: A STAPP bullet capture system was installed at Juliet Range in August / September 2008.								

TABLE 4-2-C LEAD AMMUNITION USE HISTORY KILO RANGE								
Training Year	.40 Cal Lead	9 mm Lead	7.62 mm Lead	5.56 mm Lead	.38 Cal Lead	.45 Cal Lead	.233 Cal Lead	Total
TY 2012	0	7,181	0	52,731	0	0	0	59,912
TY 2011	14,362	9,850	0	100,942	0	0	0	125,154
TY 2010	1,450	7,500	0	51,412	0	0	0	60,362
TY 2009	0	6,675	0	23,108	0	0	0	29,783
TY 2008	0	0	0	0	0	0	0	0
TY 2007	0	0	0	0	0	0	0	0
TOTAL	15,812	31,206	0	228,193	0	0	0	275,211

Note: A STAPP bullet capture system was installed at Kilo Range in August / September 2008.

TABLE 4-2-D LEAD AMMUNITION USE HISTORY CUMULATIVE						
Training Year	Echo Range	Sierra Range	Tango Range	Juliet Range	Kilo Range	Total
TY 2012	0	0	12,117	31,026	59,912	103,055
TY 2011	0	2,120	37,122	63,541	125,154	227,937
TY 2010	0	0	90,328	34,371	60,362	185,061
TY 2009	0	0	137,362	16,262	29,783	183,407
TY 2008	0	0	17,725	0	0	17,725
TY 2007	100	0	8,547	0	0	8,647
TOTAL	100	2,120	303,201	145,200	275,211	725,832

Notes: 1. Firing at Echo Range in TY 2007 was part of a one-time test for reintroducing lead ammunition.

2. Firing at Sierra Range in TY 2011 was part of a Line of Sight Analysis test.

Table 4-2-E provides information on firing of various ammunition types on the Camp Edwards ranges from TY 2002, the year of publication of the first Annual Report, through TY 2006, the year before firing of lead ammunition resumed.

TABLE 4-2-E RANGE FIRING TY 2002 – TY 2006									
Training Year	5.56 TN	5.56 Plastic	.50 cal Plastic	.45 Cal F	.40 cal F	9 mm F	12 gauge	40 mm TP	Total
TY 2006	77,703	0	0	0	0	0	0	0	77,703
TY 2005	134,331	0	0	0	0	5,552	750	475	141,108
TY 2004	200,319	11,242	8,400	0	0	18,200	6,875	240	245,276
TY 2003	286,920	100	1,200	3,900	2,900	10,750	1,250	0	307,020
TY 2002	223,241	30,662	11,097	3,880	3,000	6,000	5,275	0	283,155
TOTAL	922,514	42,004	20,697	7,780	5,900	40,502	14,150	715	1,054,262

Note: In addition to the above, during TY 2006, 1,989 rounds of lead ammunition were fired on Juliet Range by a unit without approval, and 100 rounds of lead ammunition were fired on Echo Range as part of a test.

TABLE 4-2-F
COPPER AMMUNITION USE HISTORY

Training Year	Rounds Fired 5.56 Copper Sierra Range	Rounds Fired 5.56 Copper India Range	Total Rounds Fired
TY 2012	34,359	6,601	40,960
TOTAL	34,359	6,601	40,960

Note: Firing of copper ammunition commenced at Sierra Range on July 8, 2012 and at India Range on September 15, 2012.

4.1.1.2 Training Areas

Camp Edwards has numerous areas that support military training: training areas, battle positions (formerly known as gun positions), mortar positions, observation posts, training roads, etc. The training areas also support a variety of training activities including land navigation, bivouacs, Nuclear-Biological-Chemical (NBC) training, meteorological data collection, artillery/engineer/infantry skills training, drivers (day and night) training, and Reserve Officer Training Corps (ROTC) training.

Information on utilization of the training areas and major locations within them during TY 2012 is provided in Table 4-3. The total overall utilization of the training areas since TY 2002 is included in Table 4-3-A. During TY 2012, some type of training was conducted in at least one of the training areas on 97 calendar days.

Information on activity in the training areas associated with the deer and turkey hunting seasons is not included in Tables 4-3 and 4-3-A as hunters are not tracked as they move through the various training areas and subordinate training locations within them. Information associated with the deer and turkey hunting seasons is included in Sections 3.7.5 and 3.7.6 of this report. Additionally, the numbers in Tables 4-3 and 4-3-A do not include employees and vehicles of the remediation programs and private contracting firms.

Camp Edwards sent a request to EPA Region 1 on June 5, 2012 asking for its approval for the temporary use of designated areas on the current Alpha Range for a two-to-three day period at the end of July 2012 to conduct the last part of a two-week Vehicle Crew Evaluator Subject Matter Expert (VCE-SME) course. Alpha Range was the desired location for the training as it provided good over watch for the course instructors/evaluators who, as part of grading requirements, had to maintain visual contact with the vehicles. To support the training, a small amount of immature pitch pine had to be removed along the shoulders of Wood Road and at two vehicle turn locations. On June 9, 2012, EPA Region 1 sent a letter to Camp Edwards approving the use of the designated areas for this training.

The course was focused on providing subject matter experts that can assist commanders at all levels in developing and implementing a comprehensive crew-served weapons training plan with a special emphasis on emerging from un-stabilized gun platforms. The course certified the subject matter experts to teach and certify additional vehicle crew evaluators, administer gunnery skills tests for four types of weapons, and train the actual unit gun crews on crew-served gunnery skills. The target audience for the course was squad leaders, platoon sergeants, and second and first lieutenant platoon leaders.

Camp Edwards sent a request to EPA Region 1 on September 4, 2012 asking for its approval to use the KD Range for Unmanned Aerial Systems (UAS) training using the RQ-11 Raven. The Raven is a hand-launched, unmanned, lightweight aircraft system with a wingspan of 4.5 feet and a weight of 4.2

pounds used for low-altitude reconnaissance, surveillance, force protection and convoy security, battle damage assessment, military operations in urban terrain, and target acquisition. It can be operated manually or programmed for autonomous operation, utilizing the system's advanced avionics and global positioning system navigation.

KD Range was selected for the training as it met the following operational requirements:

- A minimum of 300 meters separation between its four platforms
- Open terrain so operators/visual observers can maintain visual contact with the platforms
- Even terrain so platforms can perform successful deep stall landings without damage to platforms
- Enough space so operators can set up 10 x 10 tents with electronic equipment and generator

EPA Region 1 issued a letter on September 12, 2012 indicating that the training could occur with the understanding that additional re-characterization of the site may be necessary if the proposed training interferes with the currently known site conditions.

The training included personnel from five states: Massachusetts, Delaware, New Hampshire, Florida, and Illinois.

Civilian use of the training areas during TY 2012 included Boy Scout use of the Land Navigation 2 area, and Civil Air Patrol use of the C16 training area for land navigation training.

TABLE 4-3 TRAINING AREA USE - TY 2012					
Training Area	Training Days / Events*	Personnel		Vehicles (Wheeled)	Vehicles (Tracked)
		Military	Civilian		
NBC Complex	4	90	0	23	0
Land Navigation 1	21	1,285	0	96	0
Land Navigation 2	14	1,001	32	90	0
Land Navigation 3	15	1,050	0	90	0
A 1	2	196	0	6	0
A 2	4	818	0	34	0
A 3	6	149	0	43	0
A 4	2	622	0	28	0
A 4 SVL Objective 1	2	44	0	2	0
A 6	4	83	0	34	0
B 9	2	49	0	39	0
B 10	8	192	0	69	0
B 11	1	23	0	12	0
BA 1	2	622	0	28	0
BA 3	2	471	0	54	0
BA 4	3	82	0	33	0
BA 4 SVL Objective 2	1	22	0	4	0

TABLE 4-3 (Cont'd)
TRAINING AREA USE - TY 2012

Training Area	Training Days / Events*	Personnel		Vehicles (Wheeled)	Vehicles (Tracked)
		Military	Civilian		
BA 7	3	78	0	32	0
C 15	10	469	0	62	0
C 16	3	24	90	17	0
BP 2	3	27	0	9	0
BP 16	1	41	0	7	0
Dig Site 3	14	524	0	93	0
Training Roads	46	3,213	0	702	5
Wheelock Hill	8	79	0	25	0
Convoy LFX Training	4	202	0	34	0
Counter IED Lane	28	1,704	0	343	0
A Range (VCE-SME)	2	46	0	19	0
KD Range (UAS training)	17	326	0	9	0
TY 2012 Total	232	13,532	122	2,037	5
BP: Battle Position NBC: Tear gas is only used in the chambers Training Roads: Day and night driving routes * Training Day equates to a training event Note: Civilian use column and vehicle use columns do not include use by hunters or remediation program personnel and remediation program contractors or other contractors.					

TABLE 4-3-A
TRAINING AREA USE HISTORY

Training Year	Training Days / Events	Personnel Totals	Vehicles (Wheeled)	Vehicles (Tracked)
TY 2012	232	13,654	2,037	5
TY 2011	298	16,723	2,232	2
TY 2010	614	63,867	5,627	3
TY 2009	327	17,633	2,445	10
TY 2008	787	48,609	7,411	21
TY 2007	837	22,438	4,146	8
TY 2006	433	21,629	3,605	12
TY 2005	782	127,870	1,432	2
TY 2004	954	111,694	10,468	839
TY 2003	730	69,887	6,087	383
TY 2002	701	48,708	7,208	1,142
TOTAL	6,697	562,590	52,698	2,427

4.1.1.3 Vehicle Use

Vehicle use in the training areas during TY 2012 was 2,037 wheeled vehicles and five tracked vehicles. These numbers do not include vehicles from the IAGWSP program and contractors. During the course of TY 2012, 98,300 gallons of JP-8 fuel were pumped for vehicle use at the certified fuel distribution point in the Cantonment Area on Camp Edwards. The military no longer pumps fuel in the

field; and the fuel point and the secondary containment pads in the Tactical Training Base area represent the only certified locations for units to refuel and park and store tanker trucks at Camp Edwards.

The military also no longer conducts scheduled vehicle maintenance in the training areas. Personnel in the field are authorized only to check fluid levels and add small amounts, and repair flat tires or track sections that separate during training. Major repairs and other maintenance activities and training occur at the Unit Training Equipment Site (UTES) facility located in the Cantonment Area of Camp Edwards. The UTES facility is a vehicle and motor pool area certified to handle and contain hazardous materials and waste.

4.1.1.4 Training Support Areas (Simulators, Cantonment Area)

There are separate facilities, equipment or munitions substitutions that can simulate live military training; these are grouped under the TSA. The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards.

Table 4-4 presents the total number of training days/events and personnel that used each TSA during TY 2012. Overall historical use of the TSA since TY 2002 is included in Table 4-4-A. Since unit commanders maximize training time by rotating personnel through several different events or exercises in a given training cycle, this again presents an inflated figure for training days compared to calendar days.

Civilian use of training facilities in the Camp Edwards Cantonment Area in TY 2012 included: the Barnstable County Sheriff's office, Boston law enforcement, and the Southeast Massachusetts Law Enforcement Council SWAT team use of the Calero Mobile Military Operations on Urban Terrain facility; the Babson Veterans Club, Boy Scouts, Civil Air Patrol, MCI Framingham, and Massachusetts Maritime Academy use of the Leadership Reaction Course; Boston law enforcement use of Rappel Tower #2; Civil Air Patrol use of the Obstacle Course; and Boston law enforcement use of the Counter IED (Crawl Phase) area.

TABLE 4-4 TRAINING SUPPORT AREA USE - TY 2012			
Training Support Area	Training Days / Events	Personnel	
		Military	Civilian
Kelley Tactical Training Base	103	18,714	0
Calero Mobile Military Operations on Urban Terrain Site	58	3,565	264
Counter IED (Crawl Phase)	16	679	60
Call for Fire Trainer	55	1,685	0
Battle Simulation Center - Building 1206	154	10,272	0
Battle Simulation Center – Building 1213	60	4,320	0
Virtual Battle Trainer	13	548	0
Virtual Convoy Operations Trainer	7	198	0
Engagement Skill Trainer 2000 – A	18	834	0
Engagement Skill Trainer 2000 – B	28	856	0
Force Battle Command, Brigade & Below Trainer Lab	9	452	0
HMMWV Egress Assistance Trainer 1123	17	390	0
HMMWV Egress Assistance Trainer 1132	4	68	0
HMMWV Egress Assistance Trainer 1215	12	360	0
Improvised Explosive Device Simulator	23	9,643	0
Shoothouse	4	58	0

TABLE 4-4 (Cont'd)
TRAINING SUPPORT AREA USE - TY 2012

Training Support Area	Training Days / Events	Personnel	
Mine Resistant Ambush Protected Simulator	31	900	0
UrbanSim Battle Command Simulator	1	20	0
Virtual Battle Space 2 Trainer	5	100	0
Army Physical Fitness Test Course	46	2,428	0
Classroom – Building 3494	61	1,673	0
Leadership Reaction Course	43	1,952	247
Obstacle Course	34	1,950	64
Rappel Tower 1	15	1,482	0
Rappel Tower 2	7	63	56
TOTAL	824	63,210	691

TABLE 4-4-A
TRAINING SUPPORT AREA USE – HISTORY

Training Year	Training Days / Events	Personnel		
		Military	Civilian	Total
TY 2012	824	63,210	691	63,901
TY 2011	852	52,225	574	52,799
TY 2010	1,052	90,439	6,116	96,555
TY 2009	1,137	94,836	1,180	96,016
TY 2008	869	63,854	2,162	66,016
TY 2007	593	18,722	2,454	21,176
TY 2006	366	13,310	5,471	18,781
TY 2005	288	10,254	6,716	16,970
TY 2004	311	17,833	4,258	22,091
TY 2003	528	20,247	4,356	24,603
TY 2002	433	18,550	3,260	21,810
TOTAL	7,253	463,480	37,238	500,718

4.2 CIVILIAN USE

In addition to civilian use of the ranges and training areas in the Reserve and the Training Support Areas in the Cantonment Area, there were also deer and turkey hunting seasons during TY 2012. Information on these activities is provided in Sections 3.7.5 and 3.7.6 of this report.

4.3 OFF-SITE TRAINING

During TY 2012, the MAARNG had seventy-two elements conduct their annual two-week training cycle. Of these, fifty-eight units trained in Massachusetts, fifty-four of which trained solely at Camp Edwards. Fourteen units trained in four different states and two countries; five in Vermont, four in Wisconsin, two in Iowa, one in Utah, one in Kyrgyzstan, and one in Puerto Rico. Six units deployed overseas in support of Operation Enduring Freedom or Operation New Dawn.

The total number of Massachusetts soldiers trained during annual training for TY 2012 was 3,349 out of 6,375 soldiers. Thirteen units conducted year-round annual training consisting of 487 soldiers while 2,515 soldiers attended a military school, or returned from a deployment, in lieu of annual training.

The number of MAARNG soldiers that completed a two-week annual training cycle by general geographical location is: 2,462 in Massachusetts, 834 in other states, and fifty-three outside the continental United States.

4.4 BATTLE POSITION 2

In July 2001, EPA Region 1 issued a modification to Administrative Order #2 precluding the uses of several gun and mortar firing positions for military training activities based on EPA's concern that training activities could cause physical changes that would reduce the understanding of the locations and concentrations of contamination at the sites. One of the positions impacted was Gun Position 2 (GP 2), now called Battle Position 2 (BP 2), which is located at the northeast corner of Training Area BA 4, at the intersection of Frank Perkins Road and Wheelock Road. Once a site has been investigated and possible remediation measures applied and essentially completed, the IAGWSP and the MAARNG must request to re-use the site for training from EPA Region 1. As with the petition to re-use lead ammunition at the small arms ranges, the re-use of BP 2 needed to be coordinated with and approved by the regulatory agencies.

BP 2 has historically been used as an artillery position, rally point, bivouac site, helicopter landing zone, field administration, and maneuver tactical operations command site. It has served a particularly important role as a helicopter medical evacuation site for injured personnel to be flown out of the training area.

During TY 2007, the MAARNG requested that the use restriction for BP 2 be lifted based on information that BP 2 investigation and risk assessment, under the Gun and Mortar Investigation decision unit, had been completed by the IAGWSP and that remediation was not required for BP 2. The type of training that would be conducted at BP 2 would be the type that was conducted prior to the 1997 Administrative Order, less the live fire or artillery or mortar weapons systems, and would be conducted in compliance with the established EPSs. BP 2 is an important multi-aircraft helicopter landing site. It is one of the few grassy areas available at Camp Edwards for this type of helicopter training, and it is the only site in the Reserve available for use by Blackhawk helicopters for such. The MAARNG received approval from EPA Region 1 on January 15, 2008 to utilize BP 2 for helicopter use only.

EPA Region 1 approved the Decision Document for the Former A Range, Former K Range, and the Gun and Mortar Positions in late September 2012. The Decision Document concluded that response activities conducted at the Gun and Mortar Positions are protective of human health, the environment and the aquifer and that EPA Region 1 required no further response actions with respect to these sites. Accordingly, compatible military training activities can be conducted at BP 2.

4.5 SIMULATED MUNITIONS

The MAARNG received approval from the EMC in June 2009 to utilize two types of simulated munitions at Camp Edwards: an Ultimate Training Munitions (UTM) Man Marker Round and a Simunitions FX Marking Round. The EMC's approval was for an 18-month trial period through September 16, 2010. The approval included a requirement for the MAARNG to submit two progress

reports to the EMC. The first report was submitted in October 2009 and the second one in September 2010. The first report was included in the TY 2009 Annual Report, and both reports were included in the TY 2010 Annual Report.

On October 28, 2010, the MAARNG submitted a letter to the EMC requesting that it approve adding the UTM 5.56mm and FX Marking Round to the Camp Edwards Approved Munitions List. The EMC voted unanimously at its meeting on May 11, 2011 approving adding the two rounds to the approved list.

The EMC's June 8, 2009 letter requires that the Annual Report have a portion of the training section dedicated to details of the simulated munitions use, maintenance, monitoring, inspections, and relevant issues encountered during the applicable training period in the Reserve. The approval letter also requires the Annual Report include numbers of simulated munitions fired in the Reserve during the applicable training period and estimates (based on weight) of percent recovery of the cartridges.

During a September 2012 training event, a unit expended 1,100 Ultimate Training Munition (UTM) rounds in Objective 1 (NBC Area) of the Soldier Validation Lane (SVL). The unit was conducting Military Operations on Urban Terrain (MOUT) operations with force on force use. The unit was given a copy of the Less Than Lethal Training Ammunition Standard Operating Procedure (SOP) along with the SVL Objective 1 Range packet. Both of these documents cover the safety procedures with regards to proper Personnel Protective Equipment and policing procedures.

The unit turned in an engagement overlay outlining where the UTMs were being fired from; the actual training did vary from the overlay as to accommodate training realism. Once the training concluded, the standard procedures for policing the cartridges or "brass" were followed. The unit was issued five gallon plastic buckets and conducted a police call, focusing on the engagement areas, to pick up range debris including expended cartridges. The unit then conducted a sweep/police call of the entire site after the training concluded, and the site was subsequently inspected by Range Control. It is estimated that the recovery rate for the cartridges for TY 2012 was greater than 90 percent.

Historically, the Convoy Live Fire Lane was the primary location for use of the UTMs. The lane has since been moved from the corner of Burgoyne and Gibbs roads to Flat Rock Road. The locations of the wooden facades were placed so that the natural terrain would act as a "backstop" for the projectiles and 7 ounce canvas will also be installed to each wooden façade prior to the first unit scheduled to use UTMs on the lane. No units scheduled the use of UTMs on the Convoy Live Fire Lane in TY 2012. The anticipated primary use for future UTMs will be on the SVL utilizing the four separate objective sites. Because of the design and terrain of these objective sites, Camp Edwards along with EMC have already begun discussions on improving the Best Management Practices (BMPs) and updating the SOP. Camp Edwards will work with EMC to update and publish a revised SOP in order to improve the BMPs of UTMs on the SVL.

The EMC's June 8, 2009 letter also requires that the Annual Report include requests and steps taken by the National Guard and progress associated with converting to the use of lead free primers in simulated munitions. The MANG has no control of the progress associated with converting to the use of lead free primers in the simulated munitions. The MANG monitors the activities of the U.S. Army Environmental Command in its efforts to develop alternate munitions. And, as of this time, no new information has been provided.

Table 4-5 provides information on use of Simulated Munitions in the Reserve since the EMC's June 2009 approval.

TABLE 4-5 SIMULATED MUNITIONS USE IN THE RESERVE			
Training Year	Simunitions Rounds Fired	Ultimate Training Munitions Rounds Fired	Total Rounds Fired
TY 2012	0	1,100	1,100
TY 2011	0	0	0
TY 2010	0	36,496	36,496
TY 2009	0	22,335	22,335
TOTAL	0	59,931	59,931

During TY 2012, 2,400 rounds of UTM were fired in the Cantonment Area (versus 7,967 fired there in TY 2011, 11,458 rounds in TY 2010 and 55,626 rounds in TY 2009).

4.6 PYROTECHNICS

The EMC conditionally approved the use of pyrotechnics during TY 2010. Its March 24, 2010 approval letter required information on simulated grenade use and monitoring, and relevant issues encountered during the applicable training year, be included in the training section of the Annual Report. The approval specifically required including the numbers of simulated grenades used in the Reserve and, where applicable, the Training Areas where they were used.

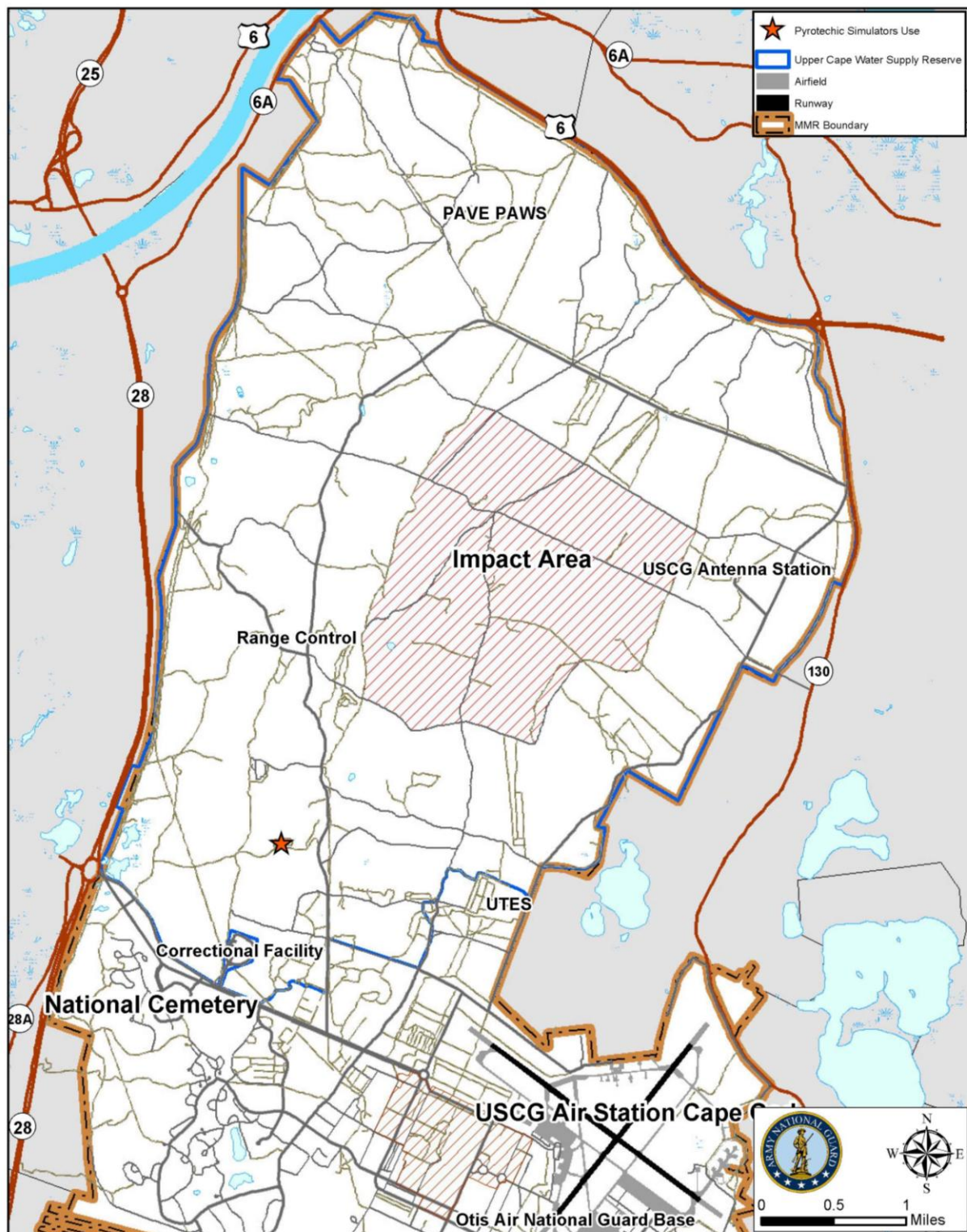
There were eight M116A1 Hand Grenade Simulators used in the Reserve during TY 2012 in the NBC area within Training Area A4. The location of their use is shown in Figure 4-4. Table 4-6 identifies the general locations in the Reserve where Hand Grenade Simulators have been used and the number used in each area.

During the use of the M116A1 Hand Grenade Simulators in TY 2012, a member of the Camp Edwards Ammunition Supply Point was physically present during each detonation to monitor use and ensure that the unit was adhering to all restrictions and limitations set forth in the Camp Edwards Standard Operating Procedure governing their use. The areas of use were swept up by Ammunition Supply Point personnel overseeing the training, with residue brought back to the Ammunition Supply Point for proper disposal.

TABLE 4-6 PYROTECHNICS USE IN THE RESERVE				
TRAINING AREA / LOCATION	TY 2010	TY 2011	TY 2012	TOTAL
A 3	5	0	0	5
A 4	61	2	8	71
B 9	23	0	0	23
B 10	15	0	0	15
B 11	42	0	0	42
C 14	50	3	0	53
C 15	50	0	0	50
BA 1	20	0	0	20
BA 6	28	0	0	28
BP 27	0	2	0	2
North Power Lines	15	0	0	15
Wheelock Road	10	0	0	10
TOTAL	319	7	8	334

Note: In addition to the above, 154 Hand Grenade Simulator devices were used in the Cantonment Area during TY 2010.

Figure 4-4 Pyrotechnic Use Locations in the Reserve - TY 2012



The EMC's March 24, 2010 approval letter required the MAARNG to submit a Summary Report on the use and environmental impacts of the simulated grenade to the EMC sixty days prior to the end of the two-year authorized use period. Camp Edwards submitted this report to the EMC and EPA Region 1 on January 19, 2012. The report concluded that there were no known environmental impacts in using the M116A1 Hand Grenade Simulators on Camp Edwards during the two year review period of 2010 – 2011. The Summary Report is provided in Appendix G.

The EMC issued a letter to Camp Edwards on February 24, 2012 indicating that the next step in the process was to present the contents of the Summary Report to the SAC for its review. As required, the information was presented to the SAC on September 13, 2012, to the CAC on September 27, 2012, and to the EMC on December 11, 2012. The M116A1 Hand Grenade Simulator remains on the list of approved munitions with the provisions of the EMC's March 24, 2010 approval letter remaining in effect.

The EMC's approval letter also requires the Annual Report to include confirmation that the chemicals and materials used in the M116A1 Hand Grenade Simulator have not significantly changed. MANG leadership reviewed the Munitions Items Disposition Access System (MIDAS) data on the M116A1 Hand Grenade Simulator and noticed no significant changes to the chemicals and materials used in the grenade simulators used during training at Camp Edwards in TY 2012.

4.7 SOLDIER VALIDATION LANE

The MAARNG announced in March 2011 plans to enhance training at Camp Edwards for deploying soldiers through a new concept referred to as a Soldier Validation Lane. The SVL uses conex-like shipping containers as training aides, which can be reconfigured to mimic small villages and used for Improvised Explosive Device (IED) training. The containers will be located in open or previously cleared, historically used training areas including training and bivouac sites within the Training Area. This type of training essentially mirrors the highly successful type of training aides utilized during the Exportable Combat Training Capability (XCTC) exercise conducted during June 2010.

The SVL allows commanders to train soldiers for full spectrum operations incorporating the latest techniques, tactics and procedures utilizing portable containers as necessary training aides configured to replicate battlefield conditions based on lessons learned from Operation Enduring Freedom (Afghanistan) and Operation New Dawn (military operations in Iraq since October 2010).

The SVL challenges commanders and leaders at all levels to make quick but deliberate decisions using the information presented to them with each training scenario. The ability to periodically reconfigure the portable training aides within the Training Area will critically enhance the ability to adapt to scenarios to the most current combat situations, ultimately helping to save the lives of soldiers on the battlefield.

The proposed installation of up to 150 containers to facilitate the creation of temporary SVLs exceeded the lowered MEPA threshold of "any new building or structure, or any expanded building or structure, either of which exceeds 500 square feet in area." As a result, MAARNG officials held a consultation with MEPA officials on March 23, 2011 and submitted a Notice of Project Change (NPC) to the MEPA office on March 30, 2011. The NPC was published in the Environmental Monitor on April 6, 2011 (Volume 75, Issue 11), followed by a 20-day public comment period that ended on April 26, 2011. In addition, MEPA held a public meeting at Camp Edwards on the SVL proposal on April 13, 2011, followed by a site tour. EOEEA issued a Certificate on May 6, 2011 indicating that the MANG had provided sufficient information for the purposes of MEPA review of the proposed SVL training and that the project could proceed to state agency review.

The SVL proposal was presented and discussed at a SAC meeting on April 6, 2011, a CAC meeting on April 21, 2011 and at a Military Civilian Community Council (MC3) meeting on April 27, 2011. It was presented to the EMC at a meeting on May 11, 2011 at which time the EMC voted unanimously in support of it under the condition that it is in compliance with any issues raised by the Massachusetts Natural Heritage and Endangered Species Program (NHSEP).

An application package was submitted to NHESP on May 9, 2011 for its review under the provisions of MESA. The NHESP program issued a letter on May 19, 2011 approving the proposal with conditions. The MAARNG submitted a letter on March 29, 2011 to EPA Region 1 on the proposed SVL training. In a letter dated May 10, 2011, EPA Region 1 approved the specific locations identified in the MAARNG's submission package.

The Counter Improvised Explosive Device (CIED) training lane, located in the Cantonment Area of Camp Edwards, was relocated to the Training Area as part of the SVL process. This involved relocating approximately twenty conex containers and 160 jersey barriers.

Four SVL locations (called objectives) were established in anticipation of TY 2012 training needs: Objective 1 in Training Area A 4; Objective 2 in Training Area BA 4; Objective 3 in Training Area B 11; and Objective 4 in Training Area C 14. The locations of the four are shown in Figure 4-5. SVL training was conducted during TY 2012 at two of these locations: Objective 1 in Training Area A 4 and Objective 2 in Training Area BA 4.

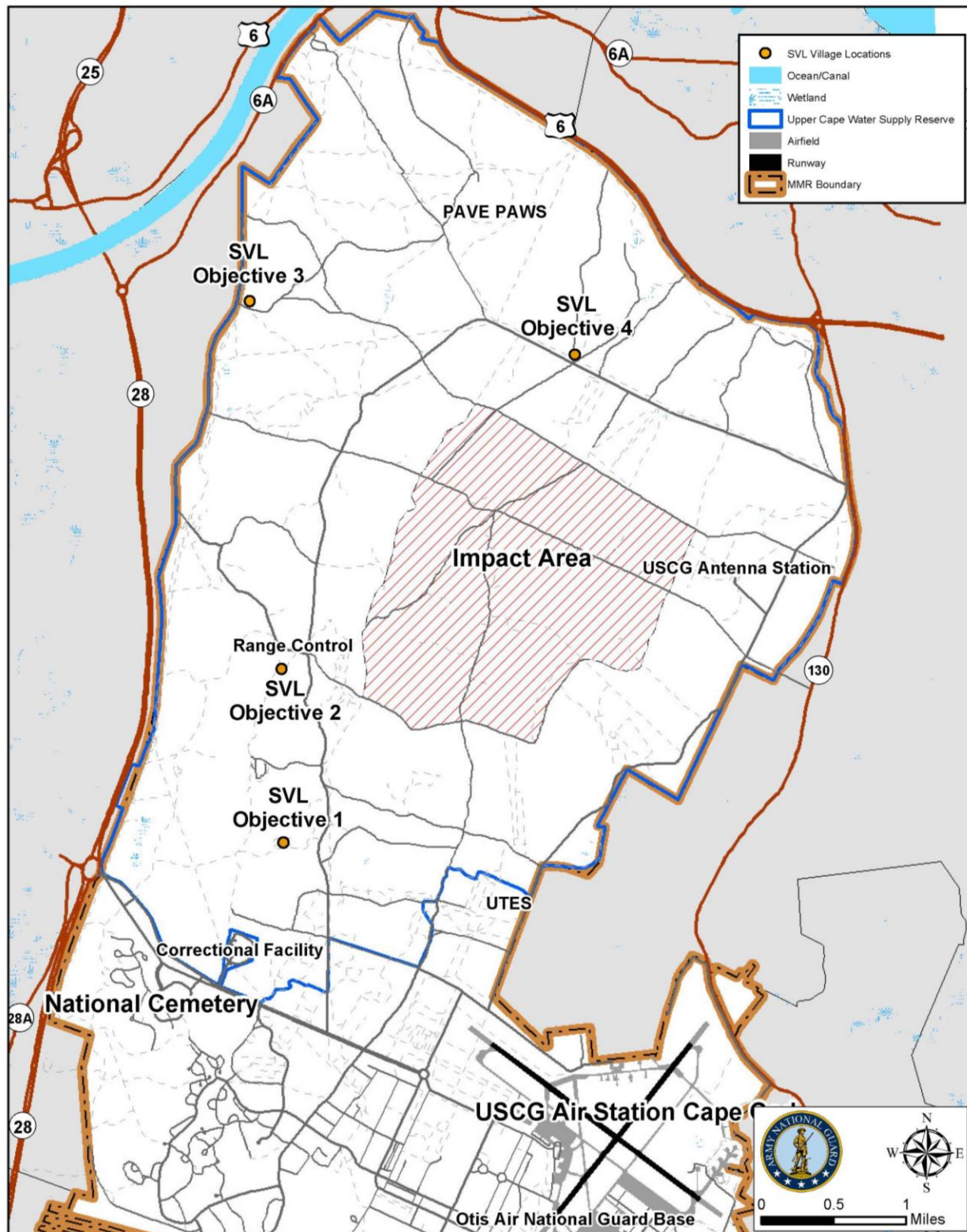
The May 19, 2011 NHESP letter approving SVL training requires a yearly monitoring report be submitted to NHESP documenting the locations and numbers of containers and the approximate dates of placement within these locations, as well as documenting any cutting of trees or leveling of sites that were required for container placement. The EOEEA May 6, 2011 Certificate requires the Annual Report to include an update on SVL monitoring and assessment, and any trends identified. The report concludes that the condition of the lanes after the training season was generally in comparable or better condition than what was identified in the initial baseline condition survey. Negative impacts included one dead tree. Positive impacts included improvements to eroded areas and the removal of material piles. A copy of the report is included in Appendix H.

Copies of documents associated with the SVL can be found on the Publications page of the E&RC's website: www.EandRC.org.

Photographs 4-1a and 4-1b SVL containers line a road in the Reserve; a “culvert” is part of the SVL training.



Figure 4-5 SVL Locations Used in the in the Reserve in TY 2012



SECTION 5 REMEDATION PROGRAM ACTIVITIES

5.0 INTRODUCTION

This section of the Annual Report provides summaries on remediation activities in the Reserve during TY 2012 as required by the July 2001 EOEEA Certificate approving the MMR Master Plan.

5.1 MMR INVESTIGATION AND REMEDIATION PROGRAMS

There are two independent cleanup programs operating at the MMR, the Installation Restoration Program (IRP) and the Impact Area Groundwater Study Program (IAGWSP).

The IRP was initially established at the MMR in 1982 under Air National Guard management. Oversight of the program was transitioned to AFCEC in 1996. The program operates under the regulatory guidance of the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The overwhelming activity of the IRP program has been focused in the Cantonment Area and in off-installation plumes emanating from the Cantonment Area. The IRP is responsible for two active sites in the Reserve: Chemical Spill (CS) 18 and CS-19.

The IAGWSP initiated cleanup of groundwater contamination on the upper 15,000 acres of the MMR in 2004. Five treatment systems are currently operating and clean more than 2.5 million gallons of groundwater per day. Construction of an additional extraction well for the J-1 southern plume and construction of a groundwater treatment system for the J-1 northern plume are planned for late TY 2012 through early TY 2013. A final remedy has been selected for the Central Impact Area; the remedy includes construction of a groundwater treatment system in TY 2013 – TY 2014 and source removal during the next five years. While no public or private drinking water supplies are affected by the groundwater contamination being addressed by the IAGWSP, the contamination is being addressed to prevent any possible future exposures. Information on the IAGWSP can be obtained on its website: <http://mmr-iagwsp.org>.

Both the IRP and IAGWSP have active regulatory participation and community involvement programs. The communities surrounding the MMR are kept informed through neighborhood notices and meetings, media releases, community updates, fact sheets, publication and distribution of plans and reports, websites, and information repositories at local libraries.

The programs also meet regularly with EPA Region 1 and MassDEP to discuss findings and determine appropriate response actions. Public comment periods are held, as necessary, to present and solicit input on proposed actions. The programs also provide updates on their activities to public meetings of the joint citizens' advisory team, the MMR Cleanup Team (MMRCT). This team was established in TY 2008 when the two cleanup programs combined their existing citizens' teams into a single advisory board. The MMRCT includes representatives from the surrounding communities and the regulatory agencies.

Representatives from the IRP and IAGWSP also meet regularly to exchange ideas and information that can make their cleanup efforts more effective. They share sampling results, equipment, technical innovations, and even a treatment facility.

The IRP and IAGWSP each operate under different regulatory directives and, for the most part, are addressing different contaminants of concern. Both programs have identified plumes of the explosive Royal Demolition Explosive (RDX). Figure 5-1 shows the extent of the areas of contamination being addressed by the IRP as composites of all contaminants found in those plumes which are primarily either chlorinated solvents or the fuel additive ethylene dibromide (EDB). The areas of contamination being addressed by the IAGWSP show the extent of the individual plumes of RDX or perchlorate.

5.2 INSTALLATION RESTORATION PROGRAM ACTIVITIES

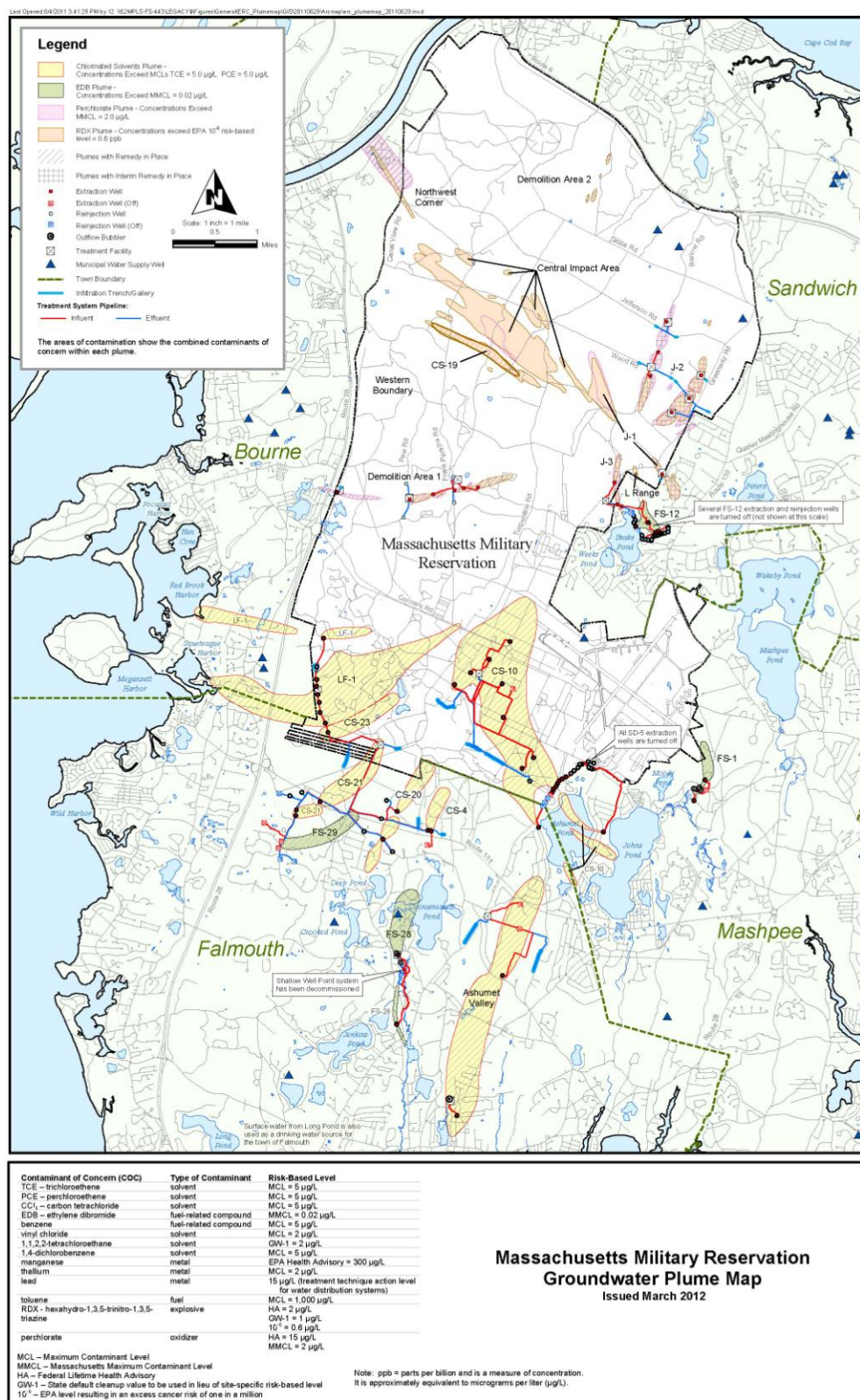
The CS-18 site consists of a single artillery firing point in the southeastern portion of the Reserve west of UTES, designated as Gun Position 9, which was used from the World War II era until 1977 for training troops. Each artillery round came supplied with the standard maximum charge of propellant in a specific number of propellant bags. Reportedly, unused propellant was routinely burned and the artillery tubes were cleaned using a solvent that was allowed to drain through the gun breech onto the ground. Additional groundwater sampling, conducted during TY 2007, did not indicate any groundwater contamination concerns. During TY 2009, the IRP conducted a removal action at CS-18 resulting in the excavation, screening and off-site disposal of 5,406 tons of soil contaminated with 2,4-dinitrotoluene (DNT). The removal action was accomplished to remove soil contaminated with contaminants of concern above removal action levels which are considered to be protective of human health and the environment. This site does not require any further remedial action, however, it is not designated as unlimited use and unrestricted exposure due to the potential Munitions and Explosives of Concern (MEC), including unexploded ordnance, that may remain within the boundaries of the site. A decision document and a soil removal action report were issued for CS-18 in September 2009.

The primary source of contamination at the CS-19 source area is ordnance and military waste disposal. An area of approximately two acres was used to bury and detonate ordnance and munitions debris at depths to 12 feet. These ordnance waste disposal practices at the CS-19 source area resulted in contaminants being released to the surrounding soil and groundwater.

AFCEC conducted a cleanup of the two-acre source area between 2004 and 2009 and removed 14,900 tons of soil, 8,500 ordnance items and 28,500 pounds of munitions debris. No further remediation work at the original two-acre site is planned.

In 2007-2009, an area to the north of the original two-acre disposal site was investigated as an ancillary activity to the CS-19 restoration project. The area has been termed the “Bunker Area” due to the presence of a concrete bunker at the northern end of the site. Based on interviews and investigations to date, it appears the Bunker Area was used for various munitions testing in the 1950s and 1960s. Geophysical and localized investigations found a small burial pit and a burn pit. Soil sampling indicated five 50’ x 50’ grids required excavation due to trinitrotoluene (TNT) or High Melting Explosive (HMX) contamination and this removal work was accomplished along with the aforementioned burn and burial pit areas. AFCEC removed 1,563 tons of soil and 3,596 pounds of munitions debris from this area. Additionally, fifteen MEC items were discovered and blown in place and twenty-six items were destroyed in a consolidated shot. No significant groundwater contamination has been found coming from this area. AFCEC issued the CS-19 Bunker Area Phase II Investigation Report in April 2011 documenting these activities.

Figure 5-1 MMR Groundwater Findings Map



The contaminant of concern in the groundwater at the CS-19 site is RDX. In the most recent comprehensive sampling round (March-May 2011), the maximum concentration for RDX in the CS-19 plume was 9.12 parts per billion (ppb). The Massachusetts GW-1 standard for RDX is 1 ppb and the EPA risk-based level is 0.6 ppb.

The CS-19 plume, shown in Figure 5-1, MMR Groundwater Findings Map originates beneath the CS-19 source area and extends approximately 5,000 feet to the northwest. It is also located in and co-mingled with the IAGWSP Central Impact Area groundwater plume study area. In April 2009, AFCEC presented a Proposed Plan for the CS-19 groundwater, in which a remedy of monitored natural attenuation and land use controls was identified. This remedy decision was later codified in the CS-19 Record of Decision published in September 2009.

Additional information about the CS-18 and CS-19 sites is included in a third Five Year Review, 2003-2007 Massachusetts Military Reservation (MMR) Superfund Site Report.

For more information on the IRP program and its activities contact Douglas Karson, AFCEC Community Involvement Specialist at (508) 968-4678, ext. 2 or at douglas.karson@us.af.mil.

5.3 IMPACT AREA GROUNDWATER STUDY PROGRAM ACTIVITIES

During TY 2012, the groundwater treatment systems for the Demolition Area 1, J-3 Range, J-2 Range northern and eastern plumes, and the J-1 Range southern plume continued to operate. These systems are treating 2.5 million gallons of water per day. Construction of an additional extraction well for the J-1 southern plume and construction of a groundwater treatment system for the J-1 northern plume are planned for late TY 2012 through early TY 2013.

The Decision Document for the Central Impact Area soil and groundwater operable units was signed in TY 2012. Construction of a groundwater treatment system to treat the Central Impact Area plume is planned for TY 2013-2014. In addition, a source-removal project will remove munitions from fifty acres of the Central Impact Area during the next five years. Removal of munitions from the first six acres commenced during calendar year 2012. Two new technologies, Metal Mapper and TEMTADS (Time-domain electromagnetic multi-sensor towed array detection system), are being evaluated as part of the initial source removal. These geophysical technologies are designed to discriminate between munitions and scrap metal in the subsurface. If successful, technologies such as these could increase the efficiency of unexploded ordnance (UXO) removal while reducing impacts to the surface soil and vegetation when compared to traditional excavation techniques.

During TY 2012, the IAGWSP continued its technology demonstration project using remotely-controlled robotic equipment from the Air Force Research Laboratory (AFRL). This work is being conducted to help determine whether robotics can provide a safer, more cost-effective and less disruptive means of removing vegetation and UXO in order to complete contaminant source removal projects. During TY 2012, AFRL completed its work excavating and sifting soil at the primary source area in the Central Impact Area. Remote-controlled equipment will continue to be used to clear vegetation from the area selected for source removal.

Investigations for Former A Range, Former K Range and thirty-five gun and mortar firing positions were completed during TY 2012 with a final Decision Document approved in late September 2012. No further actions will be required at the Former K Range and the gun and

mortar positions. Groundwater monitoring will continue at the Former A Range over the next five years.

Finally, several monitoring wells were added within the Reserve in TY 2012 (Figure 5-2) to aid in long-term monitoring of plumes with remedies in place and to provide data to finalize ongoing investigations.

Additional information on the IAGWSP's investigation and cleanup activities is available on its website: <http://mmr-iagwsp.org>.

5.4 AFCEC WIND TURBINE PROJECT

In 2005, AFCEC began the process of siting and installing a 1.5 megawatt (MW) wind turbine to partially power its groundwater treatment plants. The turbine began operating in December 2009. The Fuhrlaender wind turbine will help offset the electricity demands of the IRP cleanup efforts by 25% to 30%, saving approximately \$400,000 to \$500,000 per year over the turbine's 25-year lifespan and reducing over 100 million pounds of greenhouse gas emissions.

In 2008, the MANG, working in partnership with the Commonwealth, created the MMR Wind Energy Working Group to identify locations with potential for turbine development. This would support the federal and state alternative energy goals, while supporting military operations on the MMR. Comprised of a number of military and state agencies, including the Executive Office of Public Safety and Security and EOEEA, the group identified sites on the base with potential for the development of wind turbines. Initial selection was based on wind resources, potential for impact to habitat and residential areas, and compatibility with military operations and training.

Within the 22,000 acres of the MMR, seventeen sites were identified. Twelve were located in the southwest corner of the MMR, just north of the Crane Wildlife Management Area, and five sites were located in the Camp Edwards training area in the northwest portion of the MMR, north of the Air Force Space Command's radar site at the Cape Cod Air Force Station.

These sites were submitted to the Federal Aviation Administration (FAA) for review to determine if 400-foot tall wind turbines could be built without impacting air traffic or air traffic control infrastructure. The FAA review scrutinized the sites and found that three of the five sites in the northern section of the MMR would not have impacts. At the same time, the FAA determined that the twelve sites in the southern portion of the MMR were not suitable for 400-foot tall turbines under current FAA guidelines.

In 2009, the MMR Wind Energy Working Group, with the help of the Massachusetts Clean Energy Center and the University of Massachusetts Wind Energy Center, installed a meteorological tower in the Cantonment Area to measure and record wind speeds at the MMR. Monitoring is ongoing and periodic reports can be seen at the University of Massachusetts Wind Energy Center website.

During TY 2010, AFCEC developed a proposal to construct and operate two utility scale wind turbines in the northwest corner of the Camp Edwards training area to further offset power usage and reduce air emissions associated with the operation of the IRP's groundwater treatment facilities. The locations AFCEC selected (Figure 5-3) were two of the sites approved by the FAA.

Figure 5-2 IAGWSP Wells Installed During TY 2012

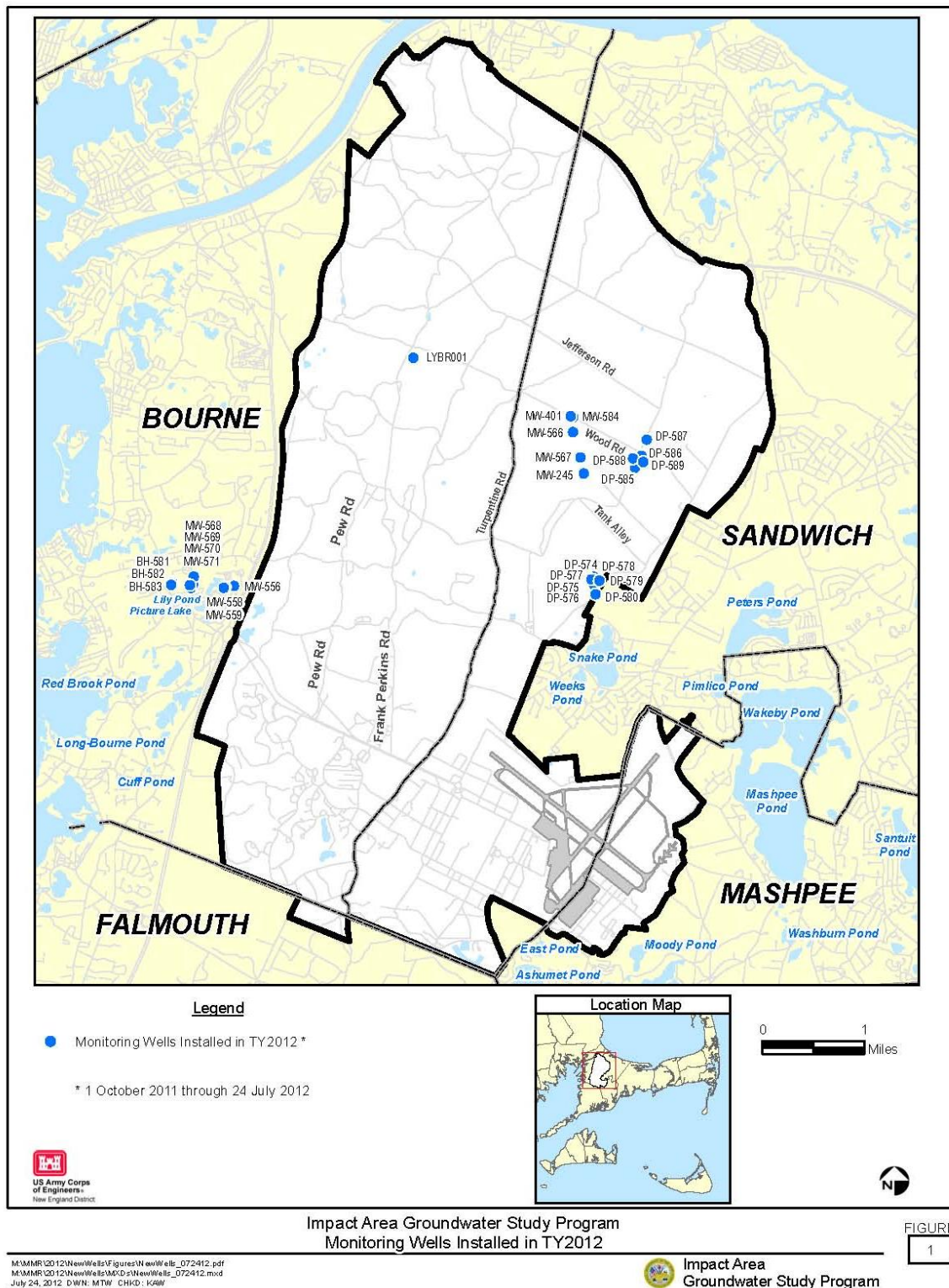
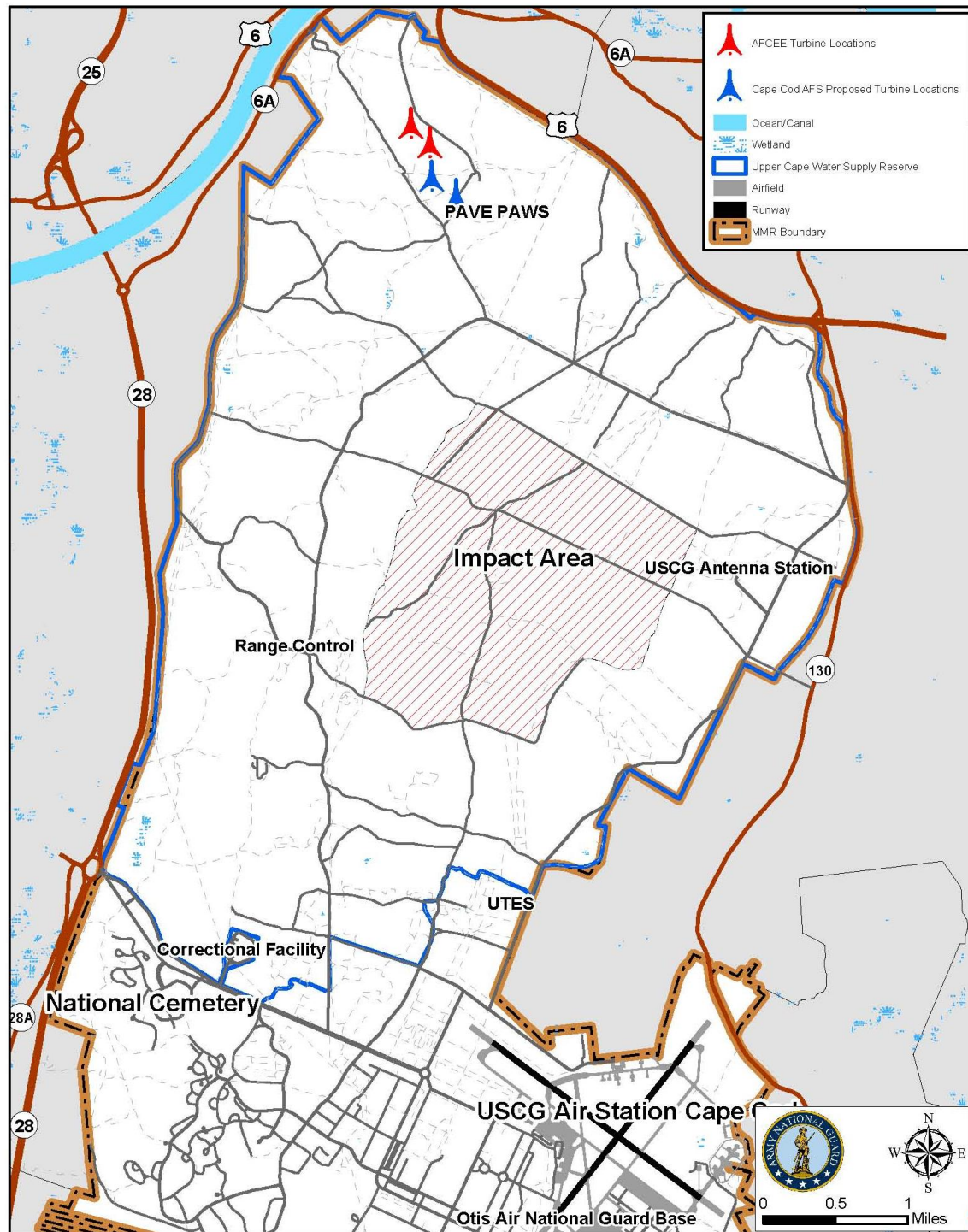


Figure 5-3 Wind Turbine Locations



AFCEC published an Environmental Assessment (EA) on its proposal under the provisions of the National Environmental Policy Act (NEPA) in August 2010. The AFCEC wind turbine project is being conducted as part of a response action under CERCLA. As such, NEPA does not legally apply to the CERCLA action, but AFCEC, as a matter of policy, elected to conduct the NEPA analysis for this particular project as a method of public outreach. Scoping activities for the EA included meetings with the CAC (March 18, 2010), SAC (March 25, 2010) and the EMC (April 8, 2010). A public comment period for the Draft EA was held from August 6 to September 7, 2010. AFCEC held a public poster-board informational session on its proposal on August 25, 2010 at the Quality Inn in Bourne, and also presented information to a joint session of the CAC and SAC immediately after the public informational session. Details of the EA and public comment were presented to the EMC on October 7, 2010. The Final EA indicated that the project will not have a significant impact on the human or natural environment.

Construction commenced during TY 2011 and the two turbines became operational during the first quarter of TY 2012 (Photos 5-1a and 5-1b).

Photograph 5-1a and 5-1b AFCEC's new wind turbines. Photograph 5-1a is an aerial view of the two AFCEC turbines from the north with Cape Cod Air Force Station in the background. Photograph 5-1b is a view of the turbines coming onto Cape Cod from the Sagamore Bridge.



SECTION 6 MISCELLANEOUS MILITARY AND CIVILIAN ACTIVITIES AND ENVIRONMENTAL PROGRAM PRIORITIES

6.1 MISCELLANEOUS MILITARY ACTIVITIES

6.1.1 MMR Master Plan Projects

6.1.1.1 Unit Training Equipment Site (UTES)

This MAARNG project, as explained in the MMR Master Plan, is construction of a new maintenance and storage facility for MAARNG tactical and engineering vehicles and training equipment. The project would consolidate three existing older vehicle maintenance facilities into one modernized facility. Engineering design of the building, which is estimated to cost \$20,000,000, was completed during TY 2012, with federal funds for construction anticipated in the federal fiscal year 2013 budget. The facility will be located approximately 1,100 feet west of the existing UTES facility (located west of Gibbs Road) which will be demolished and replaced with a controlled humidity storage building.

6.1.2 Projects at the 102nd Intelligence Wing

As a result of the 2005 Base Realignment and Closure process, the 102nd Intelligence Wing is transitioning to its new non-flying intelligence mission. Because of the mission change, there is a need for different types of facilities to support it.

The 102nd Intelligence Wing published a draft EA under the provisions of the federal NEPA on its proposed projects in January 2009. The draft EA was coordinated through applicable Massachusetts state regulatory agencies. The proposed action included demolition of buildings and structures, renovations to buildings and structures, and construction of two new facilities. Additionally, several buildings would become available for release to other federal agencies and removed from the Otis ANGB license. The ultimate goal is to create a compact installation, minimizing operational costs while maximizing mission accomplishment. After a public comment period on the draft EA, a Finding of No Significant Impact (FONSI) was signed on May 9, 2009.

As of the end of TY 2012, construction was still underway on the new Distributed Ground System Operations Facility, with a new estimated completion date during the first quarter of calendar year 2013. A new Operations and Training Facility is also under construction, but completion now isn't expected until sometime later in calendar year 2013.

6.1.3 Projects at Camp Edwards

A project was initiated in TY 2012 to completely renovate the old Camp Edwards Headquarters, Building 102. The historically significant 16,000-square-foot building, which has been vacant for years, is being remodeled while maintaining the historic aspects of the building. When completed in TY 2013, it will serve as the permanent Camp Edwards post headquarters.

Photograph 6-1 Building 102 under renovation.



6.1.4 MMR Wastewater Treatment Plant Future Options Study

The Massachusetts Development Finance Agency (MassDevelopment), on behalf of the MMR, is investigating future options for the MMR wastewater treatment plant and disposal facilities located on Otis ANGB as part of a preliminary study to determine the best and most economical use of the facilities.

MassDevelopment and its contractor, CH2MHill, held public meetings on August 30, 2012 and November 8, 2012 at the Barnstable County Fairgrounds to explain the study's scope which includes:

- Developing valuation of the existing MMR wastewater system in accordance with Department of Defense guidelines
- Developing a range of feasible options, including status quo, private contract operations, sale of system, and service to surrounding towns
- Considering regional, multi-town solutions
- Recommending the best alternative(s) to reduce costs to the MMR

The current schedule projects a draft report becoming available to the public during the first quarter of calendar year 2013.

6.1.5 Cape Cod Air Force Station (AFS) Wind Turbine Project

The 6th Space Warning Squadron, Cape Cod AFS, announced plans during TY 2011 to construct two wind turbines to help meet the electrical demands for running the PAVE PAWS radar site (approximately 13,000,000 kilowatt hours annually; \$5,000 per day). The initial goal was to install the two wind turbines within the station's existing property line. However, after reviewing the physical and operational constraints for the turbines and its radar operations, it was determined that only one turbine could be installed on the facility's property. Subsequently, discussions were held with officials from Camp Edwards that resulted in a suitable location for a wind turbine on adjacent Camp Edwards land (see Figure 5-3).

Cape Cod AFS representatives briefed their proposal to the SAC on April 6, 2011 and the CAC on April 26, 2011. The EMC was briefed at its meeting on May 11, 2011, at which time the EMC voted to approve the proposal. Cape Cod AFS received funding for the project in TY 2012 and a contract was awarded to ECC, Inc. in late September 2012. The project is expected to be completed before the end of calendar year 2013.

According to Air Force Space Command, the two 1.6 megawatt utility-scale wind turbines are expected to offset more than fifty percent of the Cape Cod Air Force Station's annual electrical purchase with an economic benefit of saving \$1,000,000 a year.

6.1.6 MMR Executive Director

The Adjutant General of the Massachusetts National Guard established the position of the Executive Director of the MMR in late TY 2012. The primary roles of the position are to ensure inter-agency communication and coordination are implemented and practiced and that government and community stakeholders are kept informed. Additionally, the Executive Director is responsible for looking at efficiencies that might be gained through consolidation and cost-sharing of base operating support operations and activities.

The Executive Director also serves as the Adjutant General's representative to the MMR Joint Oversight Group that was established out of the Joint Partnership Agreement signed in 2006 in the aftermath of the 2005 Base Realignment and Closure Commission process. The MMR Executive Director also serves on the Lieutenant Governor's Military Asset and Security Strategy Task Force helping to secure the military bases of the Commonwealth.

Colonel Anthony Schiavi, the previous commander of the MANG's 102nd Intelligence Wing, was appointed to this new position. His office is located in the MMR Fire Department facility.

6.1.7 Camp Edwards Site Consolidation Plan

The MANG published a Camp Edwards Site Consolidation Plan (SCP) in April 2005. Developed by The Cecil Group, the same contractor that helped develop the MMR Master Plan/EIR, the SCP identified a way for the MAARNG to refurbish, consolidate and improve the facilities and training conditions in the Cantonment Area of Camp Edwards. The plan identified necessary key improvements for the Camp Edwards Cantonment Area such as: consolidating of activities, reinforcing computer war-gaming capability, replacing the outdated UTES (as previously identified in the MMR Master Plan/EIR), replacing and repositioning installation security gates (including relocating the Sandwich gate further into the base to better buffer adjacent properties), etc.

Action was initiated during TY 2012 to update the SCP and expand it to include the Training Area/Reserve. One of the objectives of the revised SCP will be to better define the southern boundary of the Training Area/Reserve, as this boundary has been depicted in several ways in various documents since the days the MMR Master Plan was being developed. Once completed, the appropriate projected actions in it will be utilized by The Cecil Group, along with plans by the 102nd Intelligence Wing and U.S. Coast Guard Air Station Cape Cod, in developing a single MMR consolidated future planning document.

As SCP-related actions occur in the future specific to Camp Edwards Training Area/Reserve, they will be included in the Annual Report for the year of occurrence.

6.2 MISCELLANEOUS CIVILIAN ACTIVITIES

6.2.1 Town of Falmouth Comprehensive Wastewater Management Plan

In January 2008, the Town of Falmouth published an ENF in the Environmental Monitor (Volume 69, Issue 5) providing notice of the development of a Comprehensive Wastewater Management Plan to address nitrogen loading issues in the South Coast watershed areas of Falmouth. Its plan identified potential solutions and three alternative sites for wastewater treatment and disposal.

One of the alternatives (Alternative Plan 3) proposed conveyance of flow to a new wastewater treatment facility to be built on the Otis ANGB area of the MMR, discharge of the majority of the sewage flow at the infiltration bed area on the Camp Edwards area of the MMR (in the Reserve), and conveyance of a portion of the flow to the existing Falmouth wastewater treatment plant.

In a Certificate issued on January 30, 2008, EOEEA determined that the Town of Falmouth must develop an Environmental Impact Report on the proposal, with many specific requirements identified for addressing issues for Alternative Plan 3 involving the MMR.

Because of public concerns about costs, the Town of Falmouth established a special town Wastewater Management Plan Review Committee to review the Comprehensive Wastewater Management Plan and options to finance it, as well as exploring alternative treatment options and their costs. The committee submitted its recommendations to the Board of Selectmen in the fall of 2010. It recommended upgrading and expanding the town's existing wastewater treatment facility in West Falmouth instead of constructing a new facility on the MMR. In addition, the committee recommended the town undertake several demonstration projects to evaluate alternative technologies. The Falmouth Board of Selectmen unanimously approved the committee's recommendations in January 2011 and directed that they be incorporated into the town's Comprehensive Wastewater Management Plan/Draft Environmental Impact Report. Falmouth voters approved a ballot question in May 2011 to fund the redesign of the town's Comprehensive Wastewater Management Plan and the study of alternative treatment methods for cleaning up the town's estuaries.

The town's new plan was approved by the Board of Selectmen on July 30, 2012 and the Draft Comprehensive Wastewater Management Plan and Draft Environmental Impact Report was submitted to the MEPA office on August 15, 2012. A notice was published in the Environmental Monitor on September 5, 2012 (Volume 78, Issue 9) with a public comment period through

November 7, 2012. This new plan deleted the provision for constructing a new wastewater treatment plant on the MMR.

EOEEA issued a Certificate on the Draft Environmental Impact Report for Falmouth's revised plan on November 14, 2012. In this Certificate, the Secretary of EOEEA directed Falmouth to identify alternative sites for treated effluent disposal, ocean outfall and regional use of the MMR infiltration beds in its Final Environmental Impact Report. The Secretary also asked Falmouth to work together with the towns of Bourne, Mashpee and Sandwich and the MMR along with MassDEP, the Cape Cod Commission and others to continue the discussion of possible opportunities to integrate the town's wastewater treatment planning efforts with the wastewater management planning efforts undertaken by Mashpee and Sandwich.

6.2.2 Algae Fuel Test Facility Proposal

In January 2009, a letter was submitted to the MANG by Plankton, LLC requesting an option to lease space at the MMR for an algae-based biofuel prototype facility. The project is a joint venture spearheaded by Plankton, LLC of Wellfleet, Massachusetts, Woods Hole Oceanographic Institute, the Marine Biological Laboratory, the Regional Technology Development Corporation, MassDevelopment, and Loud Fuel of Cape Cod. As proposed, the Cape Cod Integrated Algae Biorefinery, a five-acre advanced technology test farm, would be constructed to help meet the Commonwealth's biodiesel mandate. The Massachusetts National Guard supports the project on the condition that all legal and regulatory authorizations are obtained.

An initial 'proof of concept' site has been established at the Woods Hole Oceanographic Institute's Quissett Campus in Falmouth, Massachusetts, and a more elaborate small production facility is still being considered for the Cantonment Area of the MMR.

A MOA was signed in December 2010 between the 102nd Intelligence Wing and Plankton Power, LLC allowing Plankton to remove post-treatment supernatant (liquid) and treated sludge (solid) product from the Otis ANGB wastewater treatment plant settling tank in limited amounts (basically up to ten gallons every two to four weeks), subject to written MassDEP approval conditions, during a twelve month period beginning the date of signature of the agreement. Plankton Power did not ask to have the agreement renewed after the twelve-month period expired in December 2011.

6.2.3 Otis Fish & Game Club Real Estate Request

The Otis Fish & Game Club undertook action in TY 2009 to request that the MANG authorize the club to operate out of the club occupied facilities on Camp Edwards for social, recreational, fund raising, and sportsmanship activities. The club is located in the southwest corner of the Reserve. The land parcel consists of approximately 182 acres of land with associated buildings (club house and eight storage structures and sheds) and three inactive ranges. The club receives its water from the Bourne Water District and has its own septic system.

The club completed a required Environmental Baseline Survey document and the MAARNG completed a required Record of Environmental Consideration. In turn, these documents were forwarded to the Massachusetts National Guard Joint Forces Headquarters in Milford, Massachusetts, and were included with the appropriate real property package that was forwarded to the National Guard Bureau in early TY 2010. The real property package has not been finalized as of the end of TY 2012.

6.2.4 Textron Systems / Massachusetts Military Reservation Natural Resource Damages Settlement

Massachusetts state and federal members of the Massachusetts Military Reservation Trustee Council entered into a \$1,300,000 Natural Resources Damage Settlement in October 2007 with Textron, a defense contractor that conducted weapons testing in a section of the MMR that constitutes a major groundwater recharge area for the Cape Cod Aquifer. Of the settlement money, \$1,000,000 went to the Commonwealth of Massachusetts and \$300,000 to the Department of Defense.

The public was invited to submit groundwater restoration project proposals for potential funding from portions of the settlement money in January 2009. Based on the proposals submitted, a Draft Restoration Plan was issued on March 19, 2010 with a public comment period ending on April 21, 2010. The Trustee Council held a public meeting on April 6, 2010 at the Upper Cape Regional Technical School in Bourne, Massachusetts as part of the public comment period.

In July 2010, a Final Restoration Plan was issued providing funding for two projects:

- \$400,000 for Phase I and Phase II of the Town of Sandwich's proposed project to develop a Comprehensive Water Resources Management Plan
- \$371,800 for the Upper Cape Regional Water Supply Cooperative's proposed Sagamore Lens Aquifer – Safe Yield Analysis and Water Resource Recovery, modified by the MMR Trustee Council as the Sagamore Lens Aquifer – Sustainable Management of Water Resources Plan (of which \$175,000 is funded from the Department of Defense portion of the Textron settlement)

The Water Cooperative hired Tata & Howard, Inc. to develop the Sagamore Lens Aquifer – Sustainable Management of Water Resources Plan, which is expected to be completed during calendar year 2013.

6.2.5 Barnstable County Sherriff's Office

The U.S. Army granted a license in July 2012 to the Barnstable County Sherriff's Office for the use of Building 3759 and its adjacent parking area (a total of 0.86 acres) for purposes of vehicle and communications maintenance operation and for storage of community working crew equipment. Building 3759 is located on East Hospital Road in the Cantonment Area of Camp Edwards.

6.2.6 NStar Transmission Line Project

NStar filed an ENF in October 2010 proposing to construct improvements to its transmission system in Southeastern Massachusetts to alleviate existing and projected transmission-capacity overloads and to meet existing and future peak electric load demands. The project entails constructing a new 345 kV transmission line, part of which involves its Bourne Switching Station located on its state-issued easement in the Training Area of Camp Edwards. The proposal was approved in a Certificate issued by EOEEA on August 10, 2011.

Construction of the 345 kV transmission line began in the fall of 2012 with completion anticipated during the summer of 2013.

6.2.7 Joint Land Use Study

In 2005, the Cape Cod Commission, through a grant provided by the U.S. Department of Defense Office of Economic Adjustment (OEA), prepared a Joint Land Use Study (JLUS) for the MMR and the four Upper Cape towns of Bourne, Falmouth, Mashpee, and Sandwich. The JLUS was completed with the assistance of a Technical Advisory Committee consisting of the four town planners and representatives from Camp Edwards, Otis ANGB and the Coast Guard, and a Policy Committee consisting of representatives from the Boards of Selectmen and Planning Boards in the four towns, as well as the three base commanders.

The MMR was nominated for a JLUS by the U.S. Army due to an increase in the number of training days on the Camp Edwards ranges and rapid population growth and ongoing development pressures in the four Upper Cape towns surrounding the MMR, as well as the potential for increasing land use conflicts with base operations.

In May 2011, OEA received Fiscal Year 2011 nominations from the U.S. Army for the JLUS program and recommended additional technical and financial support to assist MMR communities to update the 2005 MMR JLUS. Due to the complexity of the MMR's ownership and lease structure and the Commission's role in completing the 2005 MMR JLUS, OEA recommended the Cape Cod Commission complete the JLUS update.

The Military Civilian Community Council (MC3), established in 2001 as part of the MMR Master Plan/EIR process to serve as an advisory board to the Massachusetts National Guard for civilian projects proposed for the Cantonment Area on the MMR, was selected to serve as the Policy Committee for the updated MMR JLUS. The MC3 was briefed by Sharon Rooney of the Cape Cod Commission on the proposed JLUS Scope of Work at the council's July 12, 2012 meeting, at which time it voted on the Scope of Work for the study. Based on receiving the approved Scope of Work, OEA released the funds for the study, which is projected to be completed by June 2013. A JLUS Technical Advisory Committee was formed, consisting of representatives from the MMR and surrounding towns, and a committee meeting was held on September 7, 2012 during which Sharon Rooney presented an update on actions required and information needed to complete the study.

The Cape Cod Commission held a working group meeting with town planners on November 8, 2012 and provided a status update to the MC3 at its meeting on November 28, 2012. The final report is projected for publication in the spring of 2013.

6.3 ENVIRONMENTAL PROGRAM PRIORITIES

6.3.1 TY 2012 Environmental Program Priorities

The following subsections provide a list of the environmental program priorities established by the E&RC for TY 2012 as published in the TY 2011 Annual Report for its activities associated with the Reserve and the status of achieving them.

6.3.1.1 Natural Resources Management

- Conduct prescribed burns for habitat management, Army training and safety (Accomplished)
- Conduct prescribed fire training with regional partners as necessary (Accomplished)
- Hire a summer field survey crew to perform natural resources management program surveys (e.g., environmental monitoring plots, New England Cottontail rabbit, etc.) and other special projects as needed (Accomplished)
- Conduct RTLA surveys on environmental monitoring plots (Accomplished)
- Maintain environmental program expertise by having E&RC representative(s) attend the annual ITAM Conference and other professional development conferences and training (Accomplished)
- Provide support for the annual deer hunt (scheduled for Fall 2011) (Accomplished)
- Continue invasive plant species monitoring and control (Accomplished)

6.3.1.2 Cultural Resources Management

- Conduct applicable reviews of all IAGWSP, IRP and MAARNG proposed activities in the Reserve for potential cultural resources impacts (Accomplished)

6.3.1.3 Other E&RC Environmental Management Programs

- Develop and publish a Supplemental Environmental Impact Report on the Camp Edwards Small Arms Range Improvement Project (Accomplished)
- Provide appropriate support for environmental activities and reviews associated with obtaining approval to resume firing of copper ammunition at Sierra Range (Accomplished)
- Submit a Source Registration/Emissions Statement (SR/ES) Report (for calendar year 2011) for Camp Edwards to MassDEP (Accomplished)
- Submit a Biennial Hazardous Waste Report (for calendar year 2011) for Camp Edwards to MassDEP (Accomplished)
- Attend all scheduled EMC, CAC and SAC meetings and provide information on pertinent program activities and issues (Accomplished)
- Conduct environmental education for students (Accomplished)
- Publish the final TY 2011 State of the Reservation Report (Accomplished)

6.3.2 TY 2013 Environmental Program Priorities

The following subsections provide a list of environmental program priorities for Camp Edwards for activities associated with the Reserve in TY 2013.

6.3.2.1 Natural Resources and ITAM Management

- Conduct prescribed burns for habitat management, Army training and safety
- Conduct prescribed fire training with regional partners as necessary
- Hire a summer field survey crew to perform natural resources management program surveys (e.g., environmental monitoring plots, New England cottontail rabbit , etc.) and other special projects as needed
- Conduct RTLA surveys
- Maintain environmental program expertise by having MAARNG environmental representatives attend the annual Training Support System Conference and other professional development conferences and training
- Provide support for the annual deer hunt (scheduled for the Fall 2012)
- Continue invasive plant species monitoring and control
- Prepare and submit an annual monitoring report to NHESP documenting the locations and number of containers used for Soldier Validation Training

6.3.2.2 Cultural Resources Management

- Conduct applicable reviews of all IAGWSP, IRP and MAARNG proposed activities in the Reserve for potential cultural resources impacts
- Document any new occurrences of identified cultural resources

6.3.2.3 Other E&RC Environmental Management Programs

- Help develop a Standard Operating Procedure (SOP) for activities at Lima Range
- Coordinate required soil, lysimeter and groundwater sampling at active firing ranges in accordance with approved range management plans
- Provide appropriate support to Camp Edwards for development of an updated Joint Land Use Study
- Provide appropriate support for the development of an updated Camp Edwards Site Consolidation Plan
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Reserve
- Provide support as needed to the new MMR Executive Director position with regards to community involvement and environmental issues
- Attend all scheduled EMC, CAC and SAC meetings and provide information on environmental program activities regarding the Reserve
- Publish the final TY 2012 State of the Reservation Report

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**APPENDIX A:
ENVIRONMENTAL PERFORMANCE STANDARDS**

ENVIRONMENTAL PERFORMANCE STANDARDS JULY 11, 2007

For Massachusetts National Guard Properties at the Massachusetts Military Reservation

CAMP EDWARDS TRAINING AREA GENERAL PERFORMANCE STANDARDS

None of the following banned military training activities shall be allowed in the Camp Edwards Training Areas:

- Artillery live fire
- Mortar live fire
- Demolition live fire training
- Artillery bag burning
- Non-approved digging, deforestation or vegetation clearing
- Use of 'CS', riot control, or tear gas for training outside the NBC bunkers
- Use of field latrines with open bottoms
- Vehicle refueling outside designated Combat Service Area and Fuel Pad locations
- Field maintenance of vehicles above operator level

Limitations on the use of small arms ammunition and live weapon fire fall into the following two categories:

- Live weapon fire is prohibited outside of established small arms ranges. Live weapon fire is not allowed on established small arms ranges except in accordance with Environmental Performance Standard 19, other applicable Performance Standards, and a range-specific plan approved through the Environmental Management Commission (EMC).
- Blank ammunition for small arms and simulated munitions may be used in areas outside of the small arms ranges, using only blank ammunition and simulated munitions identified on an approved list of munitions. Joint review and approval for inclusion on the list shall be through by the Environmental & Readiness Center (E&RC) and the EMC.

Each user will be responsible for proper collection, management, and disposal of the wastes they generate, as well for reporting on those actions.

Use and application of hazardous materials or disposal of hazardous waste shall be prohibited except as described in the Groundwater Protection Policy.

Vehicles are only authorized to use the existing network of improved and unimproved roads, road shoulders, ranges and bivouac areas, except where necessary for land rehabilitation and management, water supply development, and remediation, or where roads are closed for land rehabilitation and management.

Protection and management of the groundwater resources in the Camp Edwards Training Area will focus on the following:

- Development of public and Massachusetts Military Reservation water supplies.
- Preservation and improvement of water quality and quantity (recharge).

- Activities compatible with the need to preserve and develop the groundwater resources.

All users of the Camp Edwards Training Area must comply with the provisions of the Groundwater Protection Policy and any future amendments or revisions to the restrictions and requirements. These will apply to all uses and activities within the overlays relative to Wellhead Protection, Zone II's within the Cantonment Area, and the Camp Edwards Training Areas.

Development of water supplies will be permitted within the Camp Edwards Training Area after review and approval by the managing agencies, principally the Department of the Army and its divisions, together with the Massachusetts Department of Environmental Protection, and the Massachusetts Division of Fish and Wildlife.

All phases of remediation activities will be permitted within the Camp Edwards Training Area after review and approval by the managing agencies, principally the Department of the Army and its divisions, together with the federal and state agencies who will have jurisdiction for remediation.

Pollution prevention and management of the Camp Edwards training ranges will focus on and include the following:

The Camp Edwards Training Area, including the Small Arms Ranges (SAR) and their associated "Surface Danger Zones," and any areas where small arms or other munitions or simulated munitions are used, shall be managed as part of a unique water supply area under an adaptive management program that integrates pollution prevention, and BMPs, including the recovery of projectiles. This will be done through individual range-specific plans that are written by the Massachusetts National Guard and approved for implementation through the EMC and any other regulatory agency having statutory and/or regulatory oversight. Adaptive, in this context, means making decisions as part of a continual process of monitoring, reviewing collected data, evaluating advances in range monitoring, design and technology, and responding with management actions as dictated by the resulting information and needs of protecting the environment while providing compatible military training within the Upper Cape Water Supply Reserve.

A range plan shall be designed and followed to reduce the potential for an unintended release to the environment outside of the established containment system(s) identified in the range-specific plans. All users must be aware of, and comply with, the Environmental Performance Standards that are applicable to all SAR activities. Any range specific requirements will be coordinated through the E&RC with the EMC, incorporating those specific requirements into the appropriate range-specific plans and range information packets. Camp Edwards SAR Pollution Prevention Plan shall be followed to prevent or minimize releases of metals or other compounds related to the normal and approved operation of each SAR. The adaptive SAR management program components required in each range-specific plan shall include:

- Consultation with applicable agencies with oversight of the training area before undertaking any actions that are subject to state and/or federal regulatory requirements.
- Specific recovery plans for the removal and proper disposition of spent projectiles, residues and solid waste associated with the weapons, ammunition, target systems, and/or their operation and maintenance.
- Reduction of adverse impacts to the maximum extent feasible, including consideration for the design/redesign and/or relocation of the activity or encouraging only those activities that result in meeting the goal of overall projectile and/or projectile constituent containment.
- Internal and external coordination of documentation for the Camp Edwards range management programs and other related Camp Edwards management programs including: the Integrated

- Training Area Management Program, Range Regulations, Camp Edwards Environmental Management System, Civilian Use Manual, and Standard Operating Procedures.
- Long-term range maintenance, monitoring and reporting of applicable parameters and analysis.

The Massachusetts National Guard shall ensure that all training areas where munitions or simulated munitions are used or come to be located, including range areas, range surface danger zones, and any other areas within the Upper Cape Water Supply Reserve that are operational ranges are maintained and monitored following approved management plans that include planning for pollution prevention, sustainable range use and where applicable, restoration.

Protection and management of the vegetation of the Camp Edwards Training Area for focus on the following:

- Preservation of the habitat for federal- and state-listed rare species and other wildlife.
- Preservation of the wetland resource areas.
- Activities compatible with the need to manage and preserve the vegetative resources.
- Realistic field training needs.
- Identification and restoration of areas impacted by training activities.

Goals for the Adaptive Ecosystem Management approach to management of the Camp Edwards properties will be as follows:

- Management of the groundwater for drinking water resources
- Conservation of endangered species.
- Management of endangered species habitat for continuation of the species.
- Ensuring compatible military training activities.
- Allowing for compatible civilian use.
- Identification and restoration of areas impacted by training activities.

The Environmental Performance Standards will be incorporated into the programs and regulations of the Massachusetts National Guard as follows. Those standards relating to natural resources management shall be incorporated as standards into each of the state and federal environmental management programs and attached as an appendix or written into the documentation accompanying the plan or program. All the Environmental Performance Standards will be attached to the Integrated Training Area Management Plan 'Trainer's Guide' and to the Camp Edwards Range Regulations. Modification of the Standards Operating Procedures will include review and conformance with the Environmental Performance Standards for trainers and soldiers at Camp Edwards.

SPECIFIC RESOURCE PERFORMANCE STANDARDS IN THE CAMP EDWARDS TRAINING AREA

1. Groundwater Resources Performance Standards

1.1. All actions, at any location within the Camp Edwards Training Areas, must preserve and maintain groundwater quality and quantity, and protect the recharge areas 1:0 existing and potential water supply wells. All areas within Camp Edwards Training Areas will be managed as State Zone U, and, where designated, Zone I, water supply areas.

1.2 The following standards shall apply to designated Wellhead Protection Areas:

- The 400-foot radius around approved public water supply wells will be protected from all access with signage. That protection will be maintained by the owner and/or operator of the well, or the leaseholder of the property.
- No new stormwater discharges may be directed into Zone I areas.
- No in ground septic system will be permitted within a Zone I area.
- No solid wastes may be generated or held within Zone I areas except as incidental to the construction, operation, and management of a well.
- Travel in Zone I areas will be limited to foot travel or to vehicles required for construction, operation, and maintenance of wells.
- No new or existing bivouac activity or area shall be located within a Zone I area.
- All other areas will be considered as Zone II designated areas and will be subject to the standards of the Groundwater Protection Policy.

1.3 Land-use activities that do not comply with either the state Wellhead Protection regulations (310 CMR 22.00 et seq.) or the Groundwater protection Policy are prohibited.

1.4 All activities will support and not interfere with either the Impact Area Groundwater Study and/or the Installation Restoration Program. All activities shall conform to the requirements of Comprehensive Environmental Response, Compensation and Liability Act, the Massachusetts Contingency Plan, and the Safe Drinking Water Act.

1.5 Extraction, use, and transfer of the groundwater resources must not de- grade [e.g. draw down surface waters] in freshwater ponds, vernal pools, wetlands, and marine waters, unless properly reviewed, mitigated, and approved by the managing and regulating agencies.

1.6 Land uses and activities in the Camp Edwards Training Areas will meet the following standards:

- Will conform to all existing and applicable federal, state and local regulations.
- Must be able to be implemented without interference with ongoing remediation projects.
- Allow regional access to the water supplies on the Massachusetts Military Reservation.

1.7 The following programs and standards will be used as the basis for protecting groundwater resources in the Camp Edwards Training Areas:

- Groundwater Protection Policy.
- Federal and Department of Defense environmental programs: Integrated Natural Resources Management Plan, Integrated Training Area Management Program, Range Regulations, Spill Prevention Control and Countermeasures Plan (or equivalent), Installation Restoration *Plan*, Impact Area Groundwater Study, or other remediation programs.
- State and federal laws and regulations pertaining to water supply.

2. Wetlands and Surface Water Performance Standards

2.1 Since there are relatively few wetland resources found at the Massachusetts Military Reservation, and since they are important to the support of habitat and water quality on the properties, the minimum standard will be no net loss of any of the wetland resources or their 100-foot buffers.

2.2 Land uses and activities will be managed to prevent and mitigate new adverse impacts and eliminate or reduce existing conditions adverse to wetlands and surface water resource areas. Impacts from remediation activities may be acceptable with implementation of reasonable alternatives.

2.3 Wetland area management priorities:

- Protection of existing; wetland resource areas for their contributions to existing and potential drinking water supplies.
- Protection of wetlands for rare species and their habitats.
- Protection of human health and safety.

2.4. Activities will be managed to preserve and protect wetlands and vernal pools as defined by applicable, federal, state, and local regulations. These activities will include replacement or replication of all wetland resource buffer areas, which are lost after completion of an activity or use.

2.5 All land altering activities within 100 feet of a certified vernal pool must be reviewed before commencement by the Massachusetts Department of Environmental Protection/Wetlands Unit and the Natural Heritage and Endangered Species Program within the Division of Fish and Wildlife for impacts to wildlife and habitat. The certification of vernal pools will be supported by the on site personnel and will proceed with the assistance of the appropriate state agencies.

2.6 All new uses or activities will be prohibited within the wetlands and their 100-foot buffers, except those associated with an approved habitat enhancement or restoration program; those on existing improved and unimproved roads where appropriate sediment and erosion controls are put in place prior to the activity; or those where no practicable alternative to the proposed action is available. No new roads should be located within the 100-foot buffers. Existing roads within such buffers should be relocated provided that:

- The relocation does not cause greater environmental impact to other resources.
- There are funds and resources allocated for resource management and that those resources are approved and available for the relocation.

2.7 During the period of 1 March to 15 June, roads within 500 feet of all wetlands will be closed to vehicle access to protect the migration and breeding of amphibians, with the following exceptions:

- The primary roads -Frank Perkins, Burgoyne, Gibbs and Greenway Roads will not normally be closed during this period.
- Emergency response and environmental management activities will not be restricted.

2.8 No new bivouac area shall be located within 500 feet of any wetland. Any existing bivouac within a wetland buffer shall be relocated provided there are funds and resources allocated for the relocation.

3. Rare Species Performance Standards

3.1 As the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife has identified the entire Massachusetts Military Reservation as State Priority Habitat for state-listed species (version dated 2000-2001), all activities and uses must comply with the Massachusetts Endangered Species Act and its regulations.

3.2 Where activities and uses are not specifically regulated under the Camp Edwards Training Area Range and Environmental Regulations, including these Environmental Performance Standards, the MMR Environmental and Readiness Center must review the activities for conformance with the Integrated

Natural Resource Management Plan, and shall- consult with the Natural Heritage and Endangered Species Program regarding potential impacts to state-listed species.

3.3 All activities impacting rare species habitat must be designed to preserve or enhance that habitat as determined by the MMR Environmental and Readiness Center in consultation with the Natural Heritage and Endangered Species Program.

3.4 Users are prohibited from interfering with state and federal listed species.

3.5 Users will report all sightings of recognized listed species, e.g. box turtles, within any area of the Massachusetts Military Reservation.

4. Soil Conservation Performance Standards

4.1 Activities and uses must be compatible with the limitations of the underlying soils. Limitations on uses and activities may be made where the soils or soil conditions would not support the activity.

4.2 Agricultural soil types will be preserved for future use.

4.3 Any perennial or intermittent stream identified by the Environmental & Readiness Center Office will be protected from siltation by retaining undisturbed vegetative buffers to the extent feasible.

4.4 Cultural resource evaluations must be completed before any earth-moving operation may take place in undisturbed areas with high potential for cultural resources, and earth moving may be limited to specific areas (See Cultural Resource Performance Standards).

4.5 An erosion control analysis will be made part of the land management programs (Integrated Natural Resource Management Plan, the Integrated Training Area Management Program, Range Regulations, Civilian Use, and Standard Operating Procedures) for the Camp Edwards Training Area, including appropriate mitigation measures where existing or potential erosion problems are identified.

4.6 For all improved and unimproved roads, ditches and drainage ways:

- All unimproved roads, ditches, roads and drainage ways identified for maintenance will be cleaned of logs, slash and debris.
- Unimproved roads and roads may not otherwise be improved unless approved for modification.
- Any trail, ditch, road, or drainage way damaged by activities will be repaired in accordance with the hazard and impact it creates.

4.7 Erosion-prone sites will be inspected periodically to identify damage and mitigation measures.

5. Vegetation Management Performance Standards

5.1 All planning and management activities impacting vegetation

- Will ensure the maintenance of native plant communities, and
- Shall be performed to maintain the biological diversity.

5.2 Revegetation of disturbed sites will be achieved by natural and artificial recolonization by native species.

5.3 Timber harvesting or clear-cutting of forested areas should not occur on steep slopes with unstable soils or within the buffers to wetland resources.

5.4 Vegetation management will be subject to a forest management and fire protection program prepared by the users in accordance with federal standards, and carried out in a manner acceptable to the Massachusetts Military Reservation Committee and other state agencies or commissions, as may be designated by the Commonwealth of Massachusetts.

6. Habitat Management Performance Standards

6.1 The Camp Edwards Training Area will be managed as a unique rare species and wildlife habitat area under an adaptive ecosystem management program that integrates ecological, socio-economic, and institutional perspectives, and which operates under the following definitions:

- Adaptive means making decisions as part of a continual process of monitoring, reviewing collected data, and responding with management actions as dictated by the resulting information and needs of the system.
- Ecosystem means a system-wide understanding of the arrangements of living and non-living things, and the forces that act upon and within the system.
- Management entails a multi-disciplinary approach where potentially competing interests are resolved with expert analysis, user and local interest considerations, and a commitment to compromise interests when the broader goal is achieved to manage the Camp Edwards Training Area as a unique wildlife habitat area.

6.2 The adaptive ecosystem management program will include:

- Coordinated documentation for the management programs, Integrated Natural Resource Management Plan, the Integrated Training Area Management Program, Range Regulations, Civilian Use, and Standard Operating Procedures.
- The Massachusetts National Guard Environmental and Readiness Center staff and necessary funding to support its ecosystem management plans, as related to the amount of training occurring.
- Cooperative agreements to create a management team of scientific and regulatory experts.
- Long-term land maintenance, monitoring of resources and trends, study and analysis.
- Recovery plans for species and habitats identified for improvement.
- Consultation with Federal and State agencies charged with oversight of the Endangered Species Program before any actions that may affect state and federal-listed species habitat.
- Reduction of adverse impacts to the maximum extent possible, including consideration for the relocation of the activity or encouraging only those activities that result in meeting a habitat management goal.
- Habitat management activities designed to promote protection and restoration of native habitat types.

7. Wildlife Management Performance Standards

7.1 Native wildlife habitats and ecosystems management will focus on the following:

- Protecting rare and endangered species, and,
- Maintaining biodiversity.

7.2 Hunting, recreation and educational trips must be approved, scheduled, planned, and supervised through Range Control.

7.3 Any activity or use will prioritize protection of life, property, and natural resource values at the boundaries of the Camp Edwards Training Area where wildlife interfaces with the surrounding built environment.

7.4 Wildlife management will include the following actions, specific to the species targeted for management:

- Development and implementation of a plan to monitor hunting of game species.
- Planning for multi-use objectives for recreation and hunting that incorporate public input and recommendations.
- Development of suitable monitoring programs for federal and state-listed species, and regular exchange of information with the Natural Heritage and Endangered Species Program.

8. Air Quality Performance Standard

8.1 All uses and activities will be responsible for compliance with both the State Implementation Plan for Air Quality and the Federal Clean Air Act.

8.2 Air quality management activities will include air sampling if required by regulation of the activity.

9. Noise Management Performance Standards

9.1 Noise management activities shall conform to the Army's Environmental Noise Management Program policies for evaluation, assessment, monitoring, and response procedures.

10. Pest Management Performance Standards

10.1 Each user will develop and implement an Integrated Pest Management Program to control pest infestations that may include outside contracting of services. Non-native biological controls should not be considered unless approved by federal and state agencies.

10.2 Each user will be held responsible for management of pests that threaten rare and endangered species, or are exotic and invasive species. Invasive plant species that may be considered pest species are those defined by the United States Fish and Wildlife Service and the Massachusetts Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife office. Site-specific analysis will be performed before implementation of any proposed pest management plans.

10.3 Pest vegetation control must be balanced against environmental impact and any proposed pest management activities, including the use of herbicides and mechanical methods, within rare species habitat areas must be approved by the Natural Heritage and Endangered Species Program, or in the case of federally listed species, by the United States Fish and Wildlife Service.

10.4 Only herbicide formulations approved by the United States Environmental Protection Agency, the Department of Agriculture, the agency managing the user, and the Commonwealth of Massachusetts may be applied.

10.5 Herbicides and pesticides will not be applied by aerial spraying unless required by emergency conditions and approved under applicable state and federal regulations.

11. Fire Management Performance Standards

11.1 All activities and uses shall manage, prevent, detect, and suppress fires on the Camp Edwards Training Area in coordination with the local and state fire services and natural resource managers in the Environmental & Readiness Center.

11.2 Prescribed burns will be used as a habitat management and fire prevention tool. Prescribed burns will be used to reduce natural fire potential and create or maintain diverse and rare species habitat.

11.3 Pre-suppression activities will include strategic firebreaks and other management of vegetation in high risk and high-incidence areas. The Integrated Natural Resource Management Plan and Fire Management Plan will be consulted for proposed actions.

11.4 Other than the above, no open fires are allowed.

12. Stormwater Management Performance Standards

12.1 All stormwater facilities shall comply with the State Department of Environmental Protection Guidelines for Stormwater Management, including Best Management Practices and all other applicable standards for control and mitigation of increased storm water flow rates and improvement of water quality.

12.2 All increases in stormwater runoff will be controlled within the user's property.

12.3 No new stormwater discharges will be made directly into wetlands or wetland resource areas.

13. Wastewater Performance Standards

13.1 All wastewater and sewage disposal will be in conformance with the applicable Federal and Massachusetts Department of Environmental Protection agency regulations.

14. Solid Waste Performance Standards

14.1 All solid waste streams (i.e., wastes not meeting the criteria for hazardous wastes) will be monitored and managed to substitute, reduce, recycle, modify processes, implement best management practices, and/or reuse waste, thereby reducing the total tonnage of wastes,

14.2 All users will be held responsible for collection, removal and disposal outside of the Camp Edwards Training Areas of solid wastes generated by their activities.

14.3 All users must handle solid wastes using best management practices to minimize nuisance odors, windblown litter, and attraction of vectors.

14.4 No permanent disposal of solid waste within the Groundwater protection Policy area/Camp Edwards field training areas will be permitted.

15. Hazardous Materials Performance Standards

15.1 Where they are permitted, use and application of hazardous materials shall be otherwise minimized in accordance with pollution prevention and waste minimization practices, including material substitution.

15.2 No permanent disposal of hazardous wastes within the Groundwater protection Policy area/Camp Edwards field training areas will be permitted.

15.3 Fuel Management

15.3.1 Spill Prevention, Control, and Countermeasure Plan, is in place to reduce potential for a release. Camp Edwards Spill Response Plan is in place to respond to a release if an event should occur. All users will comply with these plans at the Camp Edwards Training Area.

15.3.2 If found, non-complying underground fuel storage tanks will be removed in accordance with state and federal laws and regulations to include remediation of contaminated soil.

15.3.3 No storage or movement of fuels for supporting field activities, other than in vehicle fuel tanks, will be permitted except in approved containers no greater than five gallons in capacity.

15.3.4 New storage tanks are prohibited unless they meet the following requirements:

- Are approved for maintenance heating, or, permanent emergency generators and limited to propane or natural gas fuels.
- Conform to the Groundwater Protection Policy and applicable codes.

15.4 Non-fuel Hazardous Material Storage

15.4.1 No storage above those quantities necessary to support field training activities will be allowed within the Camp Edwards Training Area except where necessary to meet regulatory requirements, and where provided with secondary containment.

15.4.2 When required by applicable regulation, the user shall implement a Spill Prevention, Control and Containment/Emergency Response or other applicable response plan.

16. Hazardous Waste Performance Standards

16.1 All uses shall comply with applicable local, state, and federal regulations governing hazardous waste generation, management, and disposal (including overlays relative to Wellhead Protection, Zone II' s within the Cantonment Area) .

16.2 Accumulations of hazardous waste shall be handled in accordance with regulations governing accumulation and storage.

16.3 Existing facilities must implement pollution prevention and waste minimization procedures (process modifications, material substitution, recycling, and best management practices) to minimize waste generation and hazardous materials use.

16.4 Occupants and users will be held responsible for removing all solid or hazardous wastes generated during the period of use/tenancy/visitation upon their departure or in accordance with other applicable or relevant regulations.

16.5 Remedial activities undertaken under the Installation Restoration Program, the Impact Area Groundwater Study Program, the Massachusetts Contingency Plan, or other governing remediation programs are exempt from additional regulation (e.g., waste generation volume limits). Removal, storage, and disposal of contaminated material are required to comply with all state, and federal regulations.

16.6 Post-remedial uses and activities at previously impacted sites will be allowed in accordance with terms and conditions of the applicable regulations.

16.7 All hazardous wastes will be transported in accordance with federal Department of Transportation regulations governing shipment of these materials.

16.8 Transport shall reduce the number of trips for transfer and pick-up of hazardous wastes for disposal to extent feasible. Tills may include planning appropriate routes that minimize proximity to sensitive natural resource areas, and reducing internal transfers of material, including transfers from bulk storage tanks to drums, tankers, carboys, or other portable containers or quantities.

16.9 No permanent disposal of hazardous wastes within the Groundwater Protection Policy area/Camp Edwards field training areas will be permitted.

17. Vehicle Performance Standards

17.1 Vehicles within the Camp Edwards Training Area will be limited to the existing improved and unimproved road system except where required for natural resource management or property maintenance or where off-road activity areas are located and approved by the Environmental and Readiness Center in consultation with the Massachusetts Division of Fisheries and Wildlife.

17.2 Unimproved, established access ways will be limited to use by vehicles in accordance with soil conditions as described in the Soil Conservation Performance Standards.

17.3 The number of military and civilian vehicles within the Camp Edwards Training Area will be controlled using appropriate scheduling and signage.

18. General Use and Access Performance Standards

18.1 General User Requirements. Requirements that will apply to all users, both public and private, in the Camp Edwards Training Area include the following:

- All acts that pollute the groundwater supply are prohibited.
- No litter or refuse of any sort may be thrown or left in or on any property.
- All users will be held responsible for providing, maintaining, and re- moving closed-system, sanitary facilities necessary for their use and activity.
- No person shall wade or swim in any water body except for activities approved by the Massachusetts National Guard including remediation, scientific study, or research.
- Vehicles may only be driven on roads authorized and designated for such use and parked in designated areas, and may not cross any designated wetland.
- Public users may not impede the military training activities.

18.2. Civilian Use Manual. To guide public conduct on the Massachusetts Military Reservation, a Civilian Use Manual will be prepared and periodically updated. All civilian users will obtain and follow this Manual.

18.3. Siting and Design Performance Standards

18.3.1 New or expanded buildings should not be proposed within the Camp Edwards Training Areas, with the following exceptions:

- Buildings to support allowed training, operations and activities, including upgrading of those facilities currently in place,
- Buildings used for the purposes of remediation activities,
- Buildings used for the purposes of development, operation and maintenance of water supplies,
- Buildings used for the purpose of natural resource and land management.

19. Range Performance Standards

19.1. All operational ranges including but not limited to small arms ranges (SAR) shall be managed to minimize harmful impacts to the environment within the Upper Cape Water Supply Reserve. Range management at each range shall include to the maximum extent practicable metal recovery and recycling, prevention of fragmentation and ricochets, and prevention of sub-surface percolation of residue associated with the range operations. Camp Edwards shall be held responsible for the implementation of BMPs by authorized range users, including collection and removal of spent ammunition and associated debris.

19.2. Small arms ranges shall only be used in accordance with approved range plans. These plans shall be designed to minimize to the maximum extent practicable the release of metals or other contaminants to the environment outside of specifically approved containment areas/systems. Occasional ricochets that result in rounds landing outside of these containment areas is expected and every effort to minimize and correct these occurrences shall be taken. Failure to follow the approved range plans shall be considered a violation of this EPS.

19.3. All operational SARs shall be closely monitored by the Massachusetts National Guard to assess compliance of the approved range plans as well as the implementation and effectiveness of the range specific BMPs.

19.4. Camp Edwards/Massachusetts National Guard Environmental and Readiness Center shall staff and request appropriate funding to support its SAR management plans.

19.5. All users must use and follow Camp Edwards' Range Control checklists and procedures to:

- Minimize debris on the range (e.g. shell casings, used targets)
- Minimize or control residues on the ranges resulting from training (e.g., unburned constituents, metal shavings from the muzzle blast)
- Ensure the range is being used for the designated purpose in accordance with all applicable plans and approvals

19.6. Camp Edwards is responsible for following range operation procedures and maintaining range pollution prevention systems. Range BMPs shall be reviewed annually for effectiveness and potential improvements in their design, monitoring, maintenance, and operational procedures in an effort to continually improve them. Each year the annual report shall detail the range-specific activities including, but not limited to, the number of rounds fired, number of shooters and their organization, and the number of days the range was in use. The annual report will also detail active SAR groundwater well and lysimeter results, as well as any range maintenance/management activities that took place that training

year and the result of such activities, i.e. lbs of brass and projectiles recovered and recycled, etc. The Massachusetts National Guard shall provide regular and unrestricted access for the EMC to all its data and information, and will provide immediate access to environmental samples from the range, including range management and monitoring systems and any other applicable activities operating on the ranges.

19.7. Range plans and BMPs for training areas shall be reviewed and/or updated at least every three years. Management plans for new and upgraded ranges shall be in place prior to construction or utilization of the range. Range plans, at a minimum, will address long-term sustainable use, hydrology and hydrogeology, physical design, operation, management procedures, record keeping, pollution prevention, maintenance, monitoring, and applicable technologies to ensure sustainable range management. Range plans shall be integrated with other training area planning processes and resources.

19.8. The Massachusetts National Guard shall establish procedures for range maintenance and where applicable, maintenance and/or clearance operations to permit the sustainable, compatible, and safe use of operational ranges for their intended purpose within the Upper Cape Water Supply Reserve. In determining the frequency and degree of range maintenance and clearance operations, the Massachusetts National Guard shall consider, at a minimum, the environmental impact and safety hazards, each range's intended use, lease requirements, and the quantities and types of munitions or simulated munitions expended on that range.

**APPENDIX B:
LIST OF CONTACTS**

LIST OF CONTACTS

Massachusetts National Guard Environmental & Readiness Center

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 Camp Edwards, MA 02542
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Impact Area Groundwater Study Program

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 Fax: 508-968-5286

Air Force Center for Engineering and the Environment

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 322 East Inner Road
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102d Intelligence Wing Massachusetts Air National Guard

Evan Lagasse
 158 Reilly Street, 102d Intelligence Wing
 Otis ANG Base, MA 02542
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 Fax: 508-968-4290

U.S. Coast Guard

Quarterdeck Office
 USCG Air Station, Cape Cod, MA 02542
 Telephone: 508-968-6800

6th Space Warning Squadron (PAVE PAWS)

1Lt Keturah Spence, 508-968-3291
SrA William Delphia, 508-968-3289
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Sagamore, MA 02561-0428

Massachusetts National Guard, Public Affairs Office

MAJ Lisa Ahaesy
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Environmental Management Commission Environmental Officer

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**APPENDIX C:
MAINTENANCE ACTIVITIES AND SAMPLING RESULTS
TANGO, JULIET & KILO RANGES**

RANGE MAINTENANCE ACTIVITIES

TANGO, JULIET & KILO RANGE MAINTENANCE ACTIVITIES

TY 2012

DATE	TANGO	JULIET	KILO
1 Oct 11	Utilization Detailed Inspection for range firing	Utilization Detailed Inspection for range firing	Utilization Detailed Inspection for range firing
1 Oct 11	Checked water level (3 ½")	-----	Checked water level (5")
3 Oct 11	Pulled open STAPP corner to measure water reservoir. Capacity is 14.75 in. or 37.5 cm.	-----	Pumped 35 gallons. Checked water level after pumping (2")
3 Oct 11	Checked water level (3 ½")	-----	-----
4 Oct 11	-----	Checked water level (3 ¼")	Installed tarp over STAPP system (207 ft x 29 ft)
5 Oct 11	-----	Installed tarp over STAPP system (127 ft x 29 ft)	-----
5 Oct 11	-----	Checked water level (3 ¼")	-----
6 Oct 11	-----	Checked water level (3 ¼")	Checked water level (4")
6 Oct 11	-----	Installed sandbags and wood over tarp seam	Glued seams on tarp, laid plywood and sand bags
11 Oct 11	Tarp seam blew open, pulled back, placed sand bags on seam on top of wood holding frame	-----	-----
12 Oct 11	Checked water level (3 ½")	Pulled open STAPP corner to measure water reservoir. Capacity is 18.375 in. or 46.7 cm	Pulled open STAPP corner to measure water reservoir. Capacity is 16.875 in. or 42.9 cm.
12 Oct 11	Tarp seam blew open, pulled back, placed sand bags on seam on top of wood holding frame	Checked water level (3 ¼")	Checked water level (4")
14 Oct 11	Checked water level (3 ½")	Checked water level (3 ¼")	Checked water level (3 ½")
14 Oct 11	Utilization Detailed Inspection for range firing	-----	-----
14 Oct 11		-----	-----
15 Oct 11	Utilization Detailed Inspection for range firing	-----	-----
15 Oct 11	Checked water level (3 ½")	-----	-----
17 Oct 11	Checked water level (3 ½")	Checked water level (3 ¼")	Checked water level (4")
18 Oct 11	-----	Put patches on tarp where needed	Put patches on tarp where needed
19 Oct 11	Smoothed out wrinkles on tarp and placed sandbags	-----	-----
19 Oct 11	Checked water level (3 ½")	-----	-----
20 Oct 11	Checked water level (3 ½")	Checked water level (3 ¼")	Checked water level (4")
20 Oct 11	Revised combined OMMP discussed in roundtable meeting with EPA Region 1, EMC, MassDEP, MAARNG	Revised combined OMMP discussed in roundtable meeting with EPA Region 1, EMC, MassDEP, MAARNG	Revised combined OMMP discussed in roundtable meeting with EPA Region 1, EMC, MassDEP, MAARNG
24 Oct 11	Pumped 50 gallons of water from STAPP system. Checked water level after pumping (3/8")	Pumped 55 gallons of water from STAPP system. Checked water level after pumping (1/4")	Pumped 65 gallons of water from STAPP system. Checked water level after pumping (3/8")
25 Oct 11	Pumped 5 gallons of water from STAPP system. Checked water level after pumping (1/2")	Pumped 5 gallons of water from STAPP system. Checked water level after pumping (0")	Pumped 5 gallons of water from STAPP system. Checked water level after pumping (0")
31 Oct 11	pH testing completed	pH testing completed	pH testing completed
31 Oct 11	Checked water level (3/4")	Checked water level (3/8")	Checked water level (1 ¼")

DATE	TANGO	JULIET	KILO
2 Nov 11	Repaired holes and seams on STAPP system	-----	-----
2 Nov 11	Started range improvements (walkway, firing line, etc.)	-----	-----
2 Nov 11	Water level check (5/8")	-----	-----
3 Nov 11	Water level check (5/8")	-----	-----
3 Nov 11	Continued repairing holes in STAPP system cover	-----	-----
4 Nov 11	October groundwater sampling data received; sent to agencies via email same day	October groundwater sampling data received; sent to agencies via email same day	October groundwater sampling data received; sent to agencies via email same day
4 Nov 11	Finished repairing holes in STAPP system cover	-----	-----
4 Nov 11	-----	Utilization Detailed Inspection for range firing	Utilization Detailed Inspection for range firing
4 Nov 11	-----	-----	Detailed inspection / Checked water level
5 Nov 11	Utilization Detailed Inspection for range firing	Utilization Detailed Inspection for range firing	Utilization Detailed Inspection for range firing
5 Nov 11	-----	-----	Detailed inspection / Checked water level
6 Nov 11	Spread pulverized lime, 8lbs per 100 sq ft	Spread pulverized lime, 8lbs per 100 sq ft	Spread pulverized lime, 8lbs per 100 sq ft
6 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level	-----
7 Nov 11	STAPP Company reps inspect STAPP System	STAPP company reps inspect STAPP system	STAPP company reps inspect STAPP system
7 Nov 11	Water level check (5/8")	Used synthetic lumber to secure STAPP top edge	Water level check (2 1/4")-
8 Nov 11	-----	Removed bottom synthetic lumber to remove cover sag	-----
9 Nov 11	-----	Replaced bottom synthetic lumber	Placed tarp over STAPP system
9 Nov 11	Place tarp over STAPP system	-----	-----
9 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level (1/2")	Detailed inspection / Checked water level (2 1/4")
10 Nov 11	October STAPP water data received; sent to agencies via email same day	October STAPP water data received; sent to agencies via email same day	October STAPP water data received; sent to agencies via email same day
14 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level (1/2")	Detailed inspection / Checked water level (2 1/4")
16 Nov 11	October pore water sampling data received; sent to agencies same day	October pore water data received; sent to agencies same day	October pore water data received; sent to agencies same day
17 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level (1/2")	Detailed inspection / Checked water level (2 1/4")
18 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level (1/2")	-----
21 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level (1/2")	Detailed inspection / Checked water level (2 1/4")
21 Nov 11	October soil sampling data received; sent to agencies same day	October soil sampling data received; sent to agencies same day	October soil sampling data received; sent to agencies same day
22 Nov 11	Interim Draft Revised Combined OMMP plans sent to agencies with edits made as per the roundtable editing session of 20 Oct 11	Interim Draft Revised Combined OMMP plans sent to agencies with edits made as per the roundtable editing session of 20 Oct 11	Interim Draft Revised Combined OMMP plans sent to agencies with edits made as per the roundtable editing session of 20 Oct 11

DATE	TANGO	JULIET	KILO
22 Nov 11	Repaired toe boxes; continued range improvements	-----	-----
22 Nov 11	Checked water level (5/8")	-----	-----
25 Nov 11	Detailed inspection / Checked water level (5/8")	Detailed inspection / Checked water level (1/2")	Detailed inspection / Checked water level (2 1/4")
28 Nov 11	-----	pH testing completed	-----
28 Nov 11	-----	Checked water level (1/2")	-----
29 Nov 11	-----	-----	pH testing completed
29 Nov 11	-----	-----	Checked water level (2 1/4")
30 Nov 11	-----	-----	Detailed inspection / Checked water level (2 1/4")
8-Dec-11	Detailed inspection / Checked water level (5/8")	Detailed Inspection / / Checked Water Level (1")	Detailed Inspection / Checked Water Level (2 1/2")
10 Dec 11	-----	-----	Removed tarp / Detailed Inspection / Water Level (2 1/2")
11-Dec-11	Detailed inspection / Checked water level (5/8")	Checked water level (1")	Utilization Detailed Inspection for Range Firing
11 Dec 11	-----	-----	Detailed Inspection / Checked water level (2 1/2")
15-Dec-11	-----	Detailed Inspection / Checked Water Level (1")	-----
16 Dec 11	Checked water level (5/8")	-----	-----
20 Dec 11	Detailed inspection / Checked water level (5/8")	-----	-----
21-Dec-11	-----	PH Testing Completed	pH testing completed
21-Dec-11	-----	Range Maintenance (Repaired #11 Target)	Checked water level (1/2")
21-Dec-11	-----	Detailed Inspection/Checked Water Level (1")	-----
22-Dec-11	pH testing completed; Checked water level (5/8")	Detailed Inspection / Checked water level (1")	Detailed inspection / Checked water level (1/2")
22 Dec 11	Detailed inspection / Checked water level (5/8")	-----	-----
27-Dec-11	-----	Maintenance on toe box tops, replaced 100%.	-----
28-Dec-11	Detailed inspection / Checked water level (5/8")	Detailed Inspection / Checked water level (1")	Detailed inspection / Checked water level (1/2")
29-Dec-11	-----	Completed toe box top replacement, sealed seams	Maintenance on toe box tops; replaced 100 %
30 Dec 11	-----	-----	Completed toe box replacement; silicone seams
3 Jan 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water Level (1")	Detailed inspection / Checked water level (1 1/2 ")

DATE	TANGO	JULIET	KILO
6 Jan 12	-----	-----	Weather seal toe box tops; Checked water level (1 ½")
9 Jan 12	-----	Removed tarp; Checked water level (1")	Removed tarp to paint new red limit line
10 Jan 12	-----	-----	Painted both a new red limit line / primed over old line
11 Jan 12	-----	Covered STAPP with tarp	Covered STAPP with tarp; Checked water level (1 ½ ")
12 Jan 12	-----	-----	STAPP cover repairs completed
18 Jan 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water level (1")	Detailed inspection / Checked water level (1 ½ ")
25 Jan 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water level (1")	Detailed inspection / Checked water level (1 ½ ")
25 Jan 12	pH testing completed	pH testing completed	pH testing completed
25 Jan 12	Completed Range Condition Inspection / Photo Log Report	Completed Range Condition Inspection / Photo Log Report	Completed Range Condition Inspection / Photo Log Report
25 Jan 12	-----	Removed tarp to paint new red limit line of STAPP cover	-----
25 Jan 12	-----	Painted new red limit line and primed over old line	-----
26 Jan 12	-----	Covered STAPP with tarp	
31 Jan 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water level (1")	Detailed inspection / Checked water level (1 ½ ")
10 Feb 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water (1 ")	Detailed inspection / Checked water level (1 ½ ")
17 Feb 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water (1 ")	-----
17 Feb 12	-----	Removed tarp for range firing	Detailed inspection / Checked water level (1 ½ ")
17 Feb 12	-----	STAPP range inspection pre-fire	-----
17 Feb 12	-----	STAPP range inspection post-fire	-----
17 Feb 12	-----	Placed tarp back on STAPP system	-----
18 Feb 12	-----	Completed toe box repairs	
21 Feb 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water level (1 ")	Detailed inspection / Checked water level (1 ½ ")
21 Feb 12	Removed tarp, completed repairs to STAPP cover, pulled back STAPP cover so contractor could take rubber samples for testing, tarp placed back over STAPP system	Completed STAPP cover repairs / painted over old height limit line on STAPP cover	-----
27 Feb 12	Detailed inspection / Checked water level (5/8 ")	Detailed inspection / Checked water level (1 ")	Detailed inspection / Checked water level (1 ½ ")
28 Feb 12	pH testing completed	pH testing completed	pH testing completed
2 Mar 12	-----	Removed tarp for range firing	-----
2 Mar 12	-----	Completed STAPP cover repairs	-----
2 Mar 12	-----	STAPP range inspection: pre-fire	-----
2 Mar 12	-----	STAPP range inspection: post-fire	-----
3 Mar 12	-----	STAPP range inspection: pre-fire	STAPP range inspection: post-fire
3 Mar 12	-----	STAPP range inspection: post-fire	Placed tarp back on STAPP system
4 Mar 12	Detailed inspection / Checked water level (1.5 cm)	Completed STAPP cover repairs / Checked water level (2.5cm)	Detailed inspection / Checked water level (3.8cm)
4 Mar 12	-----	Placed tarp back on STAPP system	-----

DATE	TANGO	JULIET	KILO
4 Mar 12	-----	Detailed inspection / Checked water level (2.5cm)	-----
5 Mar 12	-----	-----	Removed tarp for range firing
5-6 Mar 12	-----	-----	Completed STAPP cover repairs / Checked water level (3.8cm)
7 Mar 12	-----	-----	Painted over old red line on STAPP cover
8 Mar 12	-----	-----	Placed tarp back on STAPP system
14 Mar 12	Detailed inspection / Checked water level (1.6cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
19 Mar 12	Completed STAPP cover repairs	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
19 Mar 12	Detailed inspection / Checked water level (1.6cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
22 Mar 12	Detailed inspection / Checked water level (1.6cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
28 Mar 12	Detailed inspection / Checked water level (1.6cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
3 Apr 12	Detailed inspection; Checked water level (1.6cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
12 Apr 12	Detailed inspection; Checked water level (1.6cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
12 Apr 12	-----	-----	Removed tarp for range fire
13 Apr 12	-----	-----	STAPP range inspection; pre-fire
13 Apr 12	-----	-----	STAPP range inspection; post-fire
14 Apr 12	-----	STAPP range inspection; pre-fire	STAPP range inspection; pre-fire
15 Apr 12	-----	STAPP range inspection; post-fire	STAPP range inspection; post-fire
16 Apr 12	Soil pH testing completed	STAPP cover repairs	Soil pH testing
16 Apr 12	-----	Soil pH testing completed	-----
17 Apr 12	Detailed inspection; Checked water level (1.6cm)	Completed STAPP cover repairs	Completed STAPP cover repairs
17 Apr 12	Removed tarp	Detailed inspection; Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
17 Apr 12	EPA inspection of Range (Mrs. Jane Dolan; with Mr. Mark Begley EMC/AO)		EPA inspection of range (Mrs. Jane Dolan with Mr. Mark Begley (EMC/AO)
17 Apr 12	-----	-----	Placed tarp back over STAPP system
24 Apr 12	Placed tarp back over STAPP system	Removed tarp	Removed tarp for range fire
24 Apr 12	Removed sandbags & overshot plywood in preparation for STAPP removal	Detailed inspection; Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
24 Apr 12	Detailed inspection / Checked water level (10cm)	-----	Pore water pH measured
25 Apr 12	-----	STAPP range inspection; pre-fire	STAPP range inspection; pre-fire
26 Apr 12	-----	STAPP range inspection; post-fire	STAPP range inspection; post-fire
26 Apr 12	-----	STAPP cover repairs	STAPP cover repairs
27 Apr 12	Pore water pH measured	Completed photo log report and submitted to EPA	STAPP cover repairs completed
27 Apr 12	-----	STAPP cover repairs completed	Completed photo log report and submitted to EPA

DATE	TANGO	JULIET	KILO
27 Apr 12	-----	Detailed inspection; Checked water level (3.2cm)	Detailed inspection / Checked water level (5.1cm)
27 Apr 12	-----	Pore water pH measured	-----
28 Apr 12	-----	Spread lime on range; 80 lbs per 1,000 square yards, per OMMP	Spread lime on range; 80 lbs per 1,000 square yards, per OMMP
30 Apr 12	Detailed inspection / Checked water level (10cm)	Detailed inspection; Checked water level (3.2cm)	STAPP range inspection; pre-fire
30 Apr 12	-----	Placed tarp back over STAPP cover	STAPP range inspection; post-fire
30 Apr 12	-----	-----	Detailed inspection / Checked water level (10cm)
1 May 12	-----	-----	Placed tarp over STAPP system
4 May 12		Removed tarp	Removed tarp for range fire
4 May 12		STAPP range inspection: pre-fire	STAPP range inspection: pre-fire
4 May 12		STAPP range inspection: post-fire	STAPP range inspection: post-fire
4 May 12		STAPP cover repairs	-----
6 May 12		-----	Started STAPP cover repairs (AM)
6 May 12		-----	Completed STAPP cover repairs (PM)
7 May 12		STAPP range inspection: pre-fire	-----
7 May 12		STAPP range inspection: post-fire	-----
8 May 12		STAPP cover repairs	-----
8 May 12		Placed tarp over STAPP cover	-----
9 May 12	Detailed inspection / Checked water level (10cm)	Detailed inspection / Checked water level (3.2cm)	Detailed inspection / Checked water level (5.5cm)
15 May 12	-----	-----	Removed tarp for range fire
15 May 12	-----	-----	STAPP range inspection: pre-fire
15 May 12	-----	-----	STAPP range inspection: post-fire
17 May 12	-----	-----	Completed STAPP cover repairs
18 May 12	Pumped 60 gallons of water from STAPP system; Checked water level after pumping (3cm)	Pumped 2 gallons of water from STAPP system; Checked water level after pumping (1cm)	Pumped 5 gallons of water from STAPP system; Checked water level after pumping (1cm)
18 May 12	Detailed inspection / Checked water level (3cm)	Detailed inspection / Checked water level (1cm)	Detailed inspection / Checked water level (1cm)
19 May 12	-----	-----	STAPP range inspection: pre-fire
19 May 12	-----	-----	STAPP range inspection: post-fire
20 May 12	Completed range improvements	-----	-----
21 May 12	Completed range improvements	-----	-----
21 May 12	Spread lime on range; 80 lbs per 1,000 sq yards per OMMP	-----	-----
23 May 12	-----	Replaced all sandbags on range, tarp/toe boxes/firing line	-----
24 May 12	Detailed inspection / Checked water level (3cm)	Detailed inspection / Checked water level (1cm)	Detailed inspection / Checked water level (2.9cm)
24 May 12	-----	-----	Replaced all sandbags on range, tarp/toe boxes/firing line
31 May 12	Detailed inspection / Checked water level (3cm)	Detailed inspection / Checked water level (1cm)	Detailed inspection / Checked water level (2.9cm)
1 Jun 12	-----	-----	Removed Tarp for Range Fire
1 Jun 12	-----	-----	STAPP range inspection: pre-fire
1 Jun 12	-----	-----	STAPP Range Inspection: post-fire

DATE	TANGO	JULIET	KILO
3 Jun 12	-----	-----	STAPP range inspection: pre-fire
3 Jun 12	-----	-----	STAPP Range Inspection: post-fire
4 Jun 12	-----	-----	Completed STAPP cover repairs
4 Jun 12	-----	-----	Tarp placed back over STAPP cover
7 Jun 12	-----	Removed tarp	-----
7 Jun 12	-----	STAPP range inspection: pre-fire	-----
8 Jun 12	Detailed inspection / checked water level (3cm)	STAPP Range Inspection: post-fire	Detailed inspection / checked water level (2.9cm)
8 Jun 12	-----	Tarp placed back over STAPP cover (no repairs needed)	-----
8 Jun 12	-----	Detailed inspection / checked water level (1cm)	-----
15 Jun 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (1cm)	Detailed inspection / checked water level (2.9cm)
19 Jun 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (1cm)	Detailed inspection / checked water level (2.9cm)
28 Jun 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (1cm)	Detailed inspection / checked water level (2.9cm)
5 Jul 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (1cm)	Detailed inspection / checked water level (2.9cm)
7 Jul 12	-----	Removed tarp	-----
7 Jul 12	-----	STAPP range inspection / pre-fire	-----
7 Jul 12	-----	STAPP range inspection / post fire	-----
7 Jul 12	-----	Conducted STAPP system repairs	-----
7 Jul 12	-----	Tarp placed back over STAPP cover (no repairs needed)	-----
8 Jul 12	-----	Detailed inspection / checked water level (1cm)	-----
9 Jul 12	-----	Removed tarp	-----
9 Jul 12	-----	STAPP range inspection / pre-fire	-----
9 Jul 12	-----	STAPP range inspection / post-fire	-----
9 Jul 12	-----	Tarp placed back over STAPP cover (no repairs needed)	-----
13 Jul 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (1cm)	Detailed inspection / checked water level (2.9cm)
20 Jul 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
20 Jul 12	Completed Photo Log Report	Completed Photo Log Report	Completed Photo Log Report
27 Jul 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
1 Aug 12	Detailed inspection / checked water levels (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
3 Aug 12	-----	Removed tarp	Removed tarp
3 Aug 12	-----	STAPP range inspection / pre-fire	STAPP range inspection / pre-fire
3 Aug 12	-----	STAPP range inspection / post-fire	-----
4 Aug 12	-----	STAPP cover repairs completed	STAPP range inspection / post-fire
4 Aug 12	-----	Tarp placed back over STAPP cover	STAPP cover repairs completed
4 Aug 12	-----	-----	Tarp placed back over STAPP cover
10 Aug 12	Detailed inspection / checked water levels (3cm)	Detailed inspection / checked water levels (2.5cm)	Detailed inspection / checked water level (5.5cm)

DATE	TANGO	JULIET	KILO
16 Aug 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
22 Aug 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5 cm)
22 Aug 12	Fixed berm erosion with loam; then hydroseeded		
29 Aug 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
30 Aug 12	-----	Removed tarp	-----
30 Aug 12	-----	STAPP range inspection / pre-fire	-----
30 Aug 12	-----	STAPP range inspection / post-fire	-----
31 Aug 12	-----	STAPP cover repairs completed	-----
31 Aug 12	-----	Tarp placed back over STAPP cover	-----
6 Sep 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
13 Sep 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (2.5cm)	Detailed inspection / checked water level (5.5cm)
19 Sep 12	-----	Removed tarp	-----
19 Sep 12	-----	STAPP range inspection / pre-fire	-----
19 Sep 12	-----	STAPP range inspection / post-fire	-----
20 Sep 12	-----	STAPP cover repairs completed	-----
21 Sep 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (3.5cm)	Detailed inspection / checked water level (5.5cm)
21 Sep 12	-----	Tarp placed back over STAPP cover	-----
27 Sep 12	Detailed inspection / checked water level (3cm)	Detailed inspection / checked water level (3.5cm)	Detailed inspection / checked water level

SAMPLING RESULTS



DEPARTMENTS OF THE ARMY
MASSACHUSETTS ARMY NATIONAL GUARD TRAINING SITE CAMP EDWARDS
CAMP EDWARDS, MA 02542-5003

FINAL

15 December, 2011

Lynne Jennings
US EPA Region I
One Congress Street Suite 1100
Boston, Massachusetts 02114-2023

Mark Begley
Environmental Management Commission
Bldg 1204
Camp Edwards, Massachusetts 02542

Re: J, K, and T Ranges 2011 Environmental Sampling and Analysis Report

Dear Ms. Jennings and Mr. Begley,

Attached please find the J, K, and T Ranges 2011 Environmental Sampling and Analysis Report as required by EPA's letter of July 23, 2007, Re: In re Training Range and Impact Area, Massachusetts Military Reservation, EPA Docket No. SDWA I-97-1030, Limited Authorization for Lead Ammunition Training and the more recent Pilot Period Extension letter dated January 10, 2011. The attached report covers sampling completed by the MAARNG during 2011 on these three ranges and includes all monitoring data collected as per the range-specific Best Management Practices: Operations, Maintenance, and Monitoring Plans.

Please provide any comments or other input you may have related to this report at your earliest convenience. If you have any questions or comments, please do not hesitate to contact me at (508) 968-5885.

Sincerely,

LT Colonel, MAARNG Richard M. Bertone
Deputy Post Commander

Cc: Leonard Pinaud, MassDEP
Jane Dolan, EPA
Shawn Cody, MANG/NGB
Ben Gregson, IAGWSP
Camp Edwards Range Control

**JULIET, KILO, AND TANGO RANGES
2011 ENVIRONMENTAL SAMPLING AND ANALYSIS
REPORT**

Sampling May 2011 through October 2011

1.0 INTRODUCTION

Juliet, Kilo, and Tango Ranges at Camp Edwards are 25-meter small arms ranges (SARs) currently used for marksmanship training using lead ammunition under a pilot test program approved by the US Environmental Protection Agency (EPA) and the Environmental Management Commission (EMC). The pilot test program is intended to assess the STAPP bullet containment systems installed on these three ranges and determine if the ranges can be used for live firing with lead ammunition while protecting the environment. The pilot test program has been extended at all three ranges by EPA and EMC until the end of calendar year 2011. Figure 1 shows the locations of J, K, and T Ranges within Camp Edwards.

As part of the pilot test approval, and in accordance with the conditions established by the EMC and the EPA for the Massachusetts Army National Guard (MANG) to fire lead ammunition, these ranges are operated and maintained as outlined in range-specific Best Management Practices and Operations, Maintenance, and Monitoring Plans (OMMPs). The OMMPs include a program of periodic sampling of soil, pore water, and groundwater. The samples are analyzed for range-related analytes including select metals that are commonly used in ammunition, tungsten, and the propellant nitroglycerine. Soil samples and pore water samples are also analyzed for pH which is an important parameter for determining the mobility of certain metals in the environment. The goal of this monitoring program is to determine when routine maintenance activities are needed to promote range sustainability and protect the environment.

This report summarizes the sampling program that was conducted by the MANG in 2011 as prescribed in the respective OMMPs for J, K, and T Ranges.

2.0 RANGE USE SUMMARY

J Range has been used as a SAR since the 1980s. Investigations of soil and groundwater were completed by the Impact Area Groundwater Study Program (IAGWSP) and the Final Juliet (J) Range Soil and Groundwater Investigation Report was completed in September 2008. Levels of nitroglycerine and lead that indicated deposition from range use were detected in soil. However, these analytes were not detected in groundwater. The MANG decided to remove surface soils from the range and regrade it in 2008 and a STAPP bullet collection

system was installed. The range floor was completely re-graded and reconstructed to improve drainage in 2010. Three pan lysimeters were installed on the range in 2010 to monitor pore water percolating through the soil. The pilot test period commenced on J Range in 2009. Approximately 50,000 bullets were fired into the STAPP system on the range from 2009 to 2010. An additional 60,000 bullets (approximately) were fired in 2011. This report summarizes the second and third rounds of operational samples collected under the OMMP at J Range.

K Range has been used as a SAR since the 1980s. Investigations of soil and groundwater were completed by the IAGWSP and the Final Kilo (K) Range Soil and Groundwater Investigation Report was completed in September 2008. Levels of nitroglycerine and lead that indicated deposition from range use were detected in soil. However, these analytes were not detected in groundwater. The MANG regraded the range and installed a STAPP bullet collection system in 2008. The range floor was completely re-graded and reconstructed to improve drainage in 2010. Three pan lysimeters were installed on the range in 2010 to monitor pore water percolating through the soil. The pilot test period commenced on K Range in 2009. Approximately 90,000 bullets were fired into the STAPP system on the range from 2009 to 2010. An additional 125,000 bullets (approximately) were fired in 2011. This report summarizes the second and third rounds of operational samples collected under the OMMP at K Range.

T Range has been used as a SAR since the 1980s. Investigations of soil and groundwater were completed by the IAGWSP and the Draft Final T Range Soil and Groundwater Investigation Report was completed by the IAGWSP in June 2007. Levels of nitroglycerine and lead were detected in soil that indicated deposition from range use. However, these analytes were not detected in groundwater. The MANG re-graded surface soils from the mounded firing line, in effect raising the 25-meter firing line and improving the angle of fire into the STAPP system. The area between the firing line and the new berm were not excavated or regraded. The STAPP bullet collection system was installed in 2006. Several suction lysimeters were installed in 2007 to monitor pore water percolating through the soil for tungsten. These were removed after sampling in 2010 because of concerns with the quality and representativeness of the samples. Three pan lysimeters were installed on the range in 2010. The pilot test period commenced in 2008. Operational samples were first collected under the OMMP in 2008. Approximately 254,000 bullets were fired on the range from the commencement of the pilot test through 2010. An additional 37,000 bullets were fired in 2011.

3.0 OMMP MONITORING REQUIREMENTS

3.1 Surface Soil

The soil sampling at J, K, and T Ranges includes multi-increment sampling (MIS) from 0 to 3 inches depth from 6 sample areas on each range (see Attachment 1,

Figures 1, 2, and 3). The sample areas are laid out in strips across the width of the ranges from the firing lines to the backstop berms so that the impact of deposition at the firing lines, the target areas, and the areas in between could be separately quantified.

Soil samples were collected from all three ranges in May and October 2011. The specific sample collection protocol is described in the attached "Small Arms Range Sampling and Analysis Data Report – July 2011" (Attachment 1) and "Small Arms Range Sampling and Analysis Data Report – December 2011" (Attachment 2) prepared by Tetra Tech EC, the contractor who completed the sampling. Soil samples were analyzed for antimony, copper, lead, zinc, tungsten, and nitroglycerine. Soil sampling locations are shown in Attachments 1 and 2, Figures 1, 2, and 3.

3.2 Pore Water

Pore water samples were collected from pan lysimeters installed on J, K, and T Ranges in May and October 2011. All pan lysimeters are installed approximately 2 feet below the ground surface. All pore water samples were analyzed for antimony, copper, lead, tungsten, and nitroglycerine. The locations of the lysimeters are shown on Attachments 1 and 2, Figures 1, 2, and 3.

During the October 2011 sampling round, pH readings were taken from the lysimeters for the first time. Measuring the pH of the pore water provides some indication of the effectiveness of the lime additions on the range floor. The pH readings ranged from 7.0 to 9.0 as summarized in the table below. Three of the lysimeters did not have enough water in them for readings to be taken.

LOCID	Sample_ID	Sample_Date	Analyte	Result
LYJRNG001	LYJRNG001_OCT11UA	10/12/2011	pH	8.6
LYJRNG002	LYJRNG002_OCT11UA	10/12/2011	pH	7.6
LYJRNG003	LYJRNG003_OCT11UA	10/11/2011	pH	8.0
LYKRNG001	LYKRNG001_OCT11UA	10/21/2011	pH	No water
LYKRNG002	LYKRNG002_OCT11UA	10/12/2011	pH	7.6
LYKRNG003	LYKRNG003_OCT11UA	10/12/2011	pH	9.0
LYKRNG004	LYKRNG004_OCT11UA	10/12/2011	pH	No water
LYTRNG011	LYTR011_OCT11UA	10/11/2011	pH	7.0
LYTRNG012	LYTR012_OCT11UA	10/11/2011	pH	No water
LYTRNG013	LYTR013_OCT11UA	10/11/2011	pH	8.1

3.3 Groundwater

Groundwater monitoring well locations are shown on Attachments 1 and 2, Figures 1, 2, and 3.

Groundwater samples were collected in May and October 2011. Samples were analyzed for antimony, lead, copper, zinc, tungsten, and nitroglycerine.

3.4 STAPP System Water

3.4.1 Tango Range

A total of 2,465 gallons of water were removed from the Tango Range STAPP system during training year (TY) 2011. No analytical characterization of the water was required by the receiving facility during 2011 because the water was already previously characterized. However, at the request of EPA, samples were collected and analyzed from the T Range STAPP system in October 2011. The results are included in Attachment 2 - Small Arms Range Sampling and Analysis Data Report – December 2011, Table 10. Samples of the STAPP water were also collected in the spring of 2011. The results of those analyses were provided previously under separate cover.

3.4.2 Juliet & Kilo Ranges

A total of 815 gallons was removed from the J Range STAPP system and a total of 1,545 gallons was removed from the K Range STAPP system. No analytical characterization of the water was required by the receiving facility during 2011 because the water was already previously characterized. However, at the request of EPA, samples were collected and analyzed from the J and K Range STAPP systems in October 2011. The results are included in Attachment 2 - Small Arms Range Sampling and Analysis Data Report – December 2011, Table 10. Samples of the STAPP water were also collected in the spring of 2011. The results of those analyses were provided previously under separate cover.

4.0 SUMMARY OF LABORATORY RESULTS

Laboratory data from the analyses of soil, pore water, groundwater, and STAPP water samples collected at the three ranges during this reporting period are summarized in the Small Arms Ranges Sampling and Analysis Data Reports which are provided as Attachments 1 and 2.

5.0 COMPARISON TO OMMP INTERIM ACTION LEVELS

The OMMPs for the respective ranges list interim action levels for soil, pore water, and groundwater that trigger responses at different concentrations. Action levels have been assigned for lead, antimony, and nitroglycerine in soil, pore water, and groundwater. Action levels for copper have also been assigned for pore water and groundwater (but not for soil). The action levels for soil, pore water, and groundwater are summarized on Figure 2. As presented in the OMMPs, the interim action levels were assigned for only the initial year of range operation. At all three ranges that initial year has passed, however, since the

ranges continue to operate under the pilot test program, the interim action levels continue to be used as a point of comparison for the laboratory results.

5.1 Soil

At J Range, the level 2 interim action level for nitroglycerine in soil was exceeded at Area 1 during both the May and October sampling events. No other area on J Range had any exceedences. Figures 3 and 4 summarize the soil sampling results for nitroglycerine and lead on J Range in May and October respectively.

At K Range, the level 1 interim action level for nitroglycerine in soil was exceeded in soil sample Area 1 and Area 5 in May. In October, the level 2 interim action level was exceeded in Area 1. There were no other exceedences at that time. Figure 5 and 6 summarize the soil sampling results for nitroglycerine and lead on K Range in May and October respectively.

At T Range the level 1 interim action level for nitroglycerine in soil was exceeded at sample Area 1C and the level 2 interim action level was exceeded at areas 1A, 1D, and 1E in May. This pattern was repeated in the October sampling. Figures 7 and 8 summarize the soil sampling results for nitroglycerine and lead on T Range in May and October respectively.

5.2 Pore Water

No interim action levels were exceeded in the lysimeters at J Range.

No interim action levels were exceeded in the lysimeters at K Range.

No interim action levels were exceeded in the lysimeters at T Range.

5.3 Groundwater

No interim action levels were exceeded in the groundwater monitoring wells at J Range.

No interim action levels were exceeded in the groundwater monitoring wells at K Range.

No interim action levels were exceeded in the groundwater monitoring wells at T Range.

6.0 COMPARISON WITH PREVIOUS SAMPLING RESULTS

6.1 Soil

Soil sampling on J and K Ranges started in October 2010. That was the first sample collection since reconstruction of the ranges including complete replacement of the range floors. Additional samples have been collected in May 2011 and October 2011 using the same protocols. At T Range, soil samples were collected in February 2008, October 2010, May 2011, and October 2011.

The following is a brief comparison of nitroglycerine and lead concentrations over time as these are the two primary analytes of interest.

Lead concentrations at J range have remained steady over the three sample rounds conducted. Average lead concentrations, using all 12 soil samples collected, has been 44 ppm, 53 ppm, and 50 ppm.

Lead concentrations at K range have remained steady over the three sample rounds conducted. Average lead concentrations, using all 12 soil samples collected, all been in 24, 23 ppm, and 27 ppm. These values are similar to background concentrations.

Lead concentrations at T Range should be considered in two parts. The area of the range that was reworked during construction in 2008 is represented by sample Areas 1A and 1B. The lead concentrations in Areas 1A and 1B remain similar to background concentrations. The downrange area that has remained mostly undisturbed for many years of range use is represented by areas 1C, 1D, and 1E. Lead concentrations in Areas 1C, 1D, and 1E have, on average decreased somewhat since 2010.

Average lead concentrations, ppm			
	Oct-10	May-11	Oct-11
J Range	44	53	50
K Range	24	23	27
T Range	212	165	207

Nitroglycerine concentrations have increased at all three ranges. This is probably due, at least in part, to the sample collection occurring within days after a training event on the ranges when fresh propellants were deposited on the range.

Average Nitro concentrations, ppb			
	Oct-10	May-11	Oct-11
J Range	no calc*	3702	4268
K Range	no calc*	3773	6781
T Range	14,794	10,312	12,705

*no calc= the range-wide average could not be calculated because many of the analytical results were below the reporting limit of the method

6.2 Pore Water

The pore water lysimeters at J, K, and T Ranges have been sampled three times: October 2010, May 2011, and October 2011. Lead, copper and zinc are the only analytes that have been detected in more than one sampling event but the detected concentrations have been estimated below the reporting limit each time. No significant trends have been observed at any location.

6.3 Groundwater

Copper and zinc have been detected in groundwater samples from all three ranges. However, most concentrations are estimated concentrations below the reporting limit of the analyses. No trends have been observed in any of the wells.

At T Range, a sample collected from MW-467S in March 2010 contained elevated levels of several metals including lead. This well has been resampled and analyzed for metals 3 times since then and those metals have not been detected again. This indicates that the one-time detection of lead and other metals in MW-467S was anomalous and not representative of actual conditions in the groundwater aquifer. It is suspected that interference caused by sediment containing naturally occurring metals in the unfiltered sample was the cause of the anomalous levels.

7.0 REPEATABILITY OF REPLICATE SOIL SAMPLES

Repeatability of a sampling program is assessed through the collection and analysis of replicate samples from the same sample area. The Relative Standard Deviation (RSD) of the replicates is calculated and compared to a quality goal. The RSD= the standard deviation of the three replicate results divided by the average of the three results expressed as a percentage. In Appendix C attached to EPA's May 3 2011 letter, EPA indicates a preference for RSDs of 25% or less for sampling at J, K, and T Ranges.

Replicate samples are collected from Area 1, Area 3, and Area 5 at J and K Ranges and from Area 1A, 1B, 1C, 1D, and 1E at T range. The table below summarizes the RSDs calculated for lead and nitroglycerine May and October 2011. Concentrations of other soil analytes are generally not detected or at low concentrations so the RSDs of those analytes were not calculated.

Relative Percent Differences in Replicate Samples at
J, K, and T Ranges, 2011

Range	Sample Area	May 2011 RPD – Lead	May 2011 RPD – Nitro	October 2011 RPD – Lead	October 2011 RPD – Nitro

		(%)	(%)	(%)	(%)
J	Area 1	17	23	16	21
	Area 3	67*	27*	34*	17
	Area 5	14	20	25	8
K	Area 1	5	13	11	26
	Area 3	2	14	7	9
	Area 5	4	48*	5	2
T	Area 1A	5	16	3	17
	Area 1B	14	24	11	12
	Area 1C	10	27	5	7
	Area 1D	44*	27	16	18
	Area 1E	18	14	15	4
Overall average RPD		18	23	14	13

*Despite RSD greater than 25%, all concentrations were below the interim action levels.

The RSDs for lead range from 2% to 67% with an OMMP program-wide average of 18% in May 2011 and 14% in October 2011. This indicates a successful sampling program although there are some outliers.

Note that all lead results were far below the interim action levels specified in the OMMPs, even for the samples with the worst repeatability. Specifically, the highest lead detection on any range was 522 ppm which is less than 12% of the level 1 interim action level (4535 ppm). All data have been adequate for decision making under the OMMPs and re-sampling in the areas where repeatability was poor is not needed.

The RSDs for nitroglycerine range of 2 to 48% and an average of 23% in May 2011 and 13% in October 2011. This indicates a successful sampling program although there are some outliers. This good correlation indicates that the actual concentration in the soil is likely to be within the range of the three detected values. All data have been adequate for decision making under the OMMPs and re-sampling in the areas where repeatability was poor is not needed.

8.0 FURTHER ACTION

Soil, pore water, and groundwater samples will be collected again in October 2012. The scope of the sampling at that time will be dictated by the new Combined J, K, and T Ranges OMMP that is currently being drafted. The results of the environmental monitoring conducted to date will help to inform the decisions made developing the scope of work in that document.

T Range will most likely be converted to a copper-only range using the new M855A1 bullet. When that occurs, T Range monitoring will no longer be conducted under the current T Range OMMP.

FIGURES

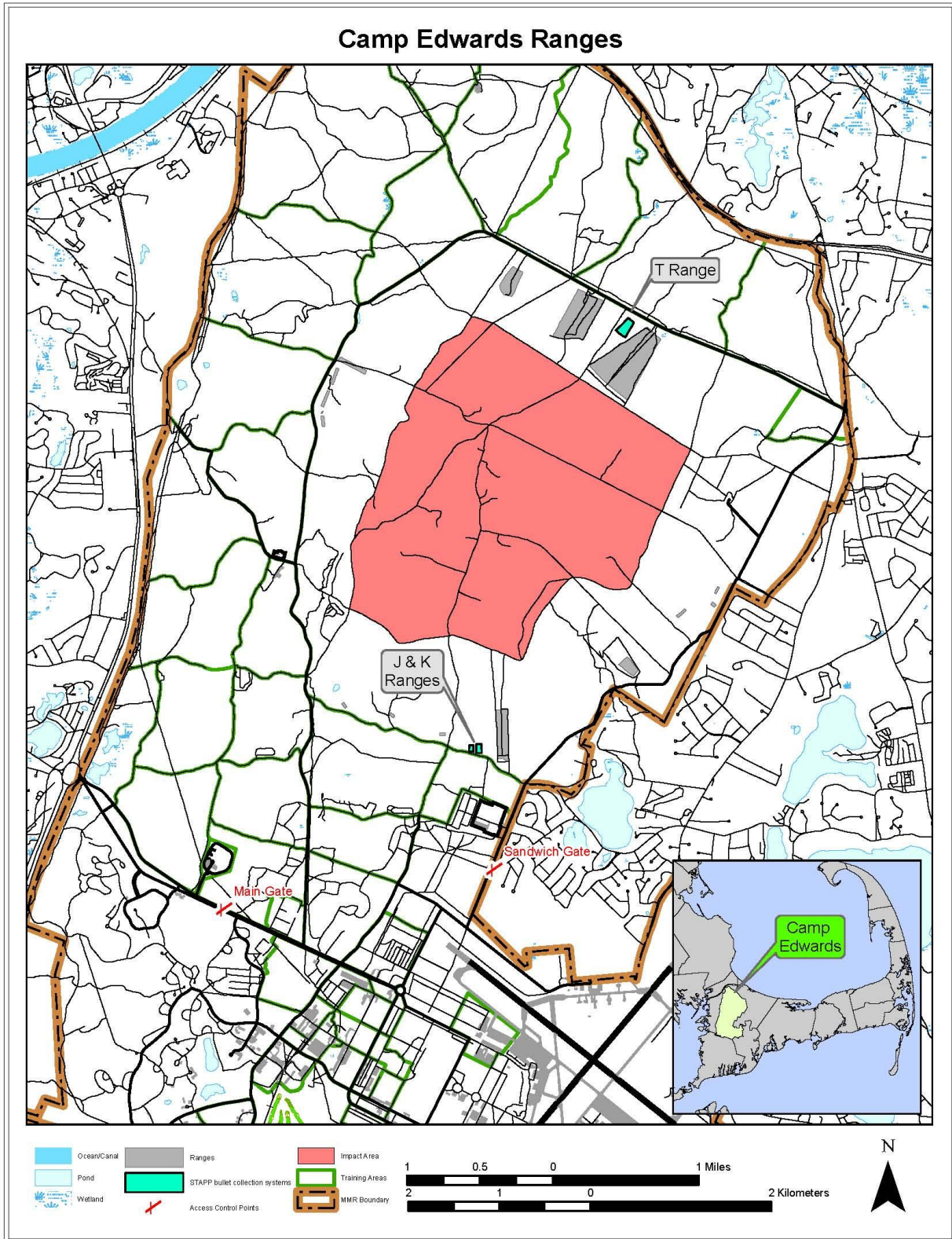


Figure 2

OMMP Interim Action Levels

**Table 4-1. Interim Surface Soil Action Levels
for the Initial Year of Fire Operations on Juliet Range**

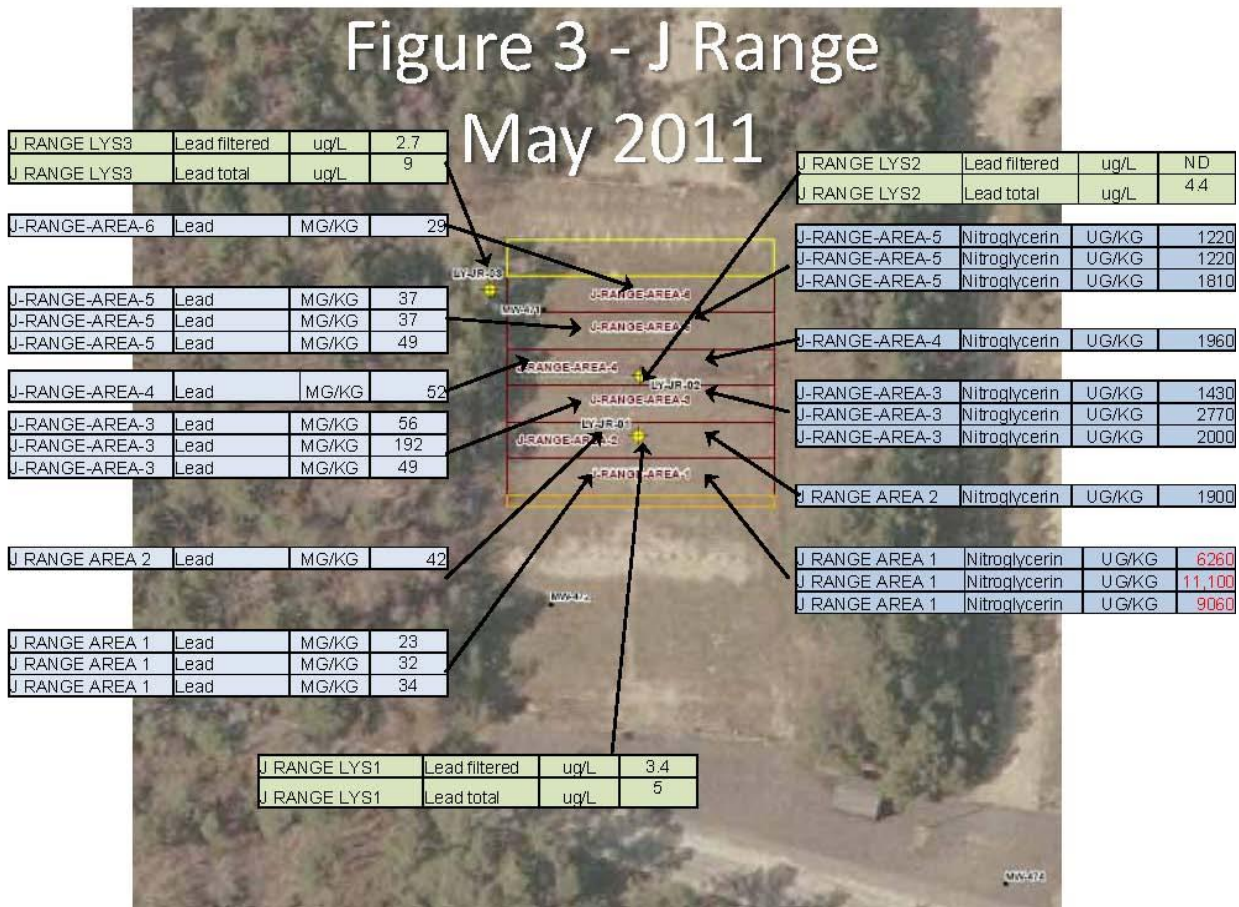
Analyte	Level 1 Resampling and Validation ¹	Level 2 Focused Reassessment ²
Lead	4,535 mg/Kg	9,070 mg/Kg
Antimony	1,750 mg/Kg	3,500 mg/Kg
Nitroglycerin	5 mg/Kg	10 mg/Kg

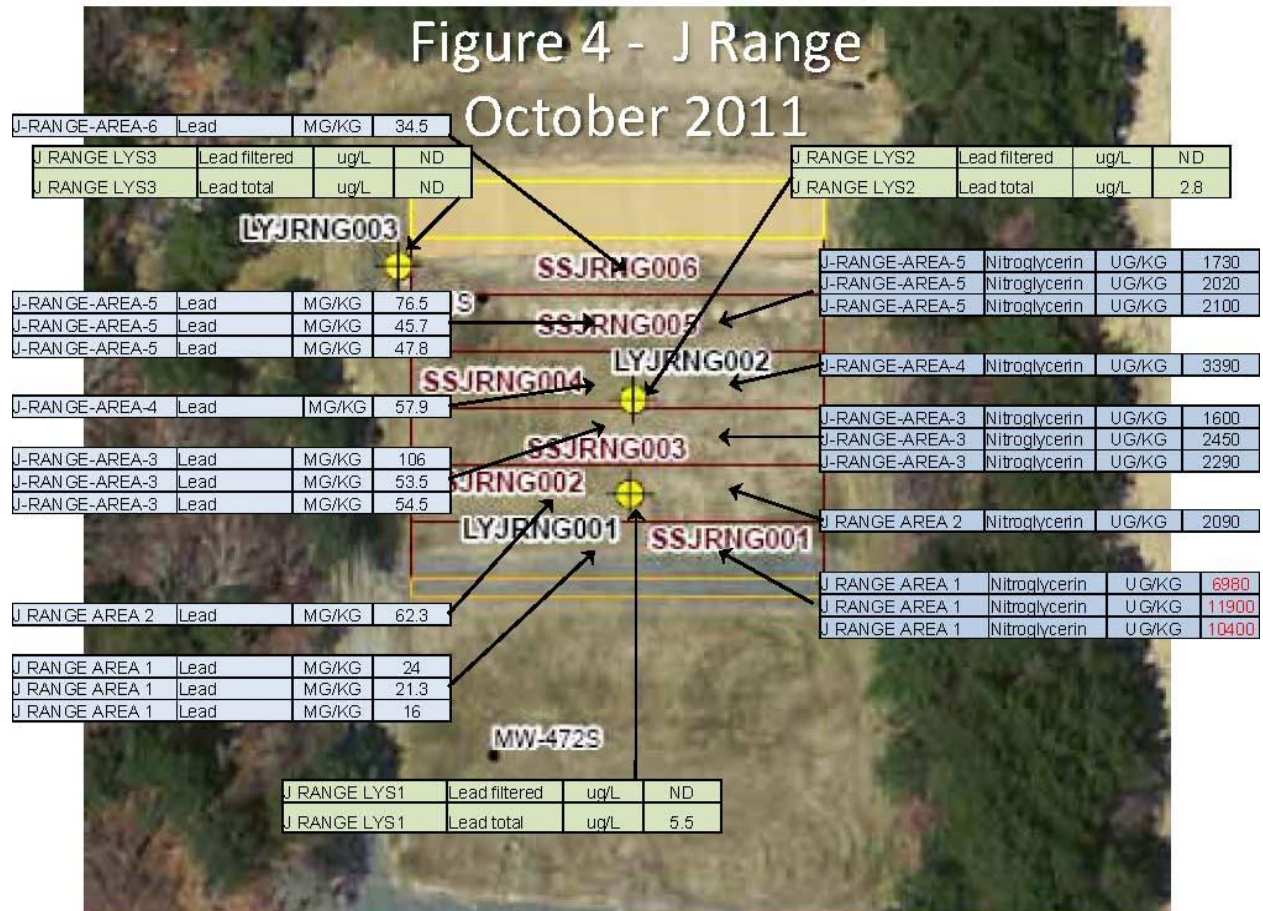
**Table 4-2. Interim Soil-Pore Water Action Levels
for the Initial Year of Fire Operations on Juliet Range**

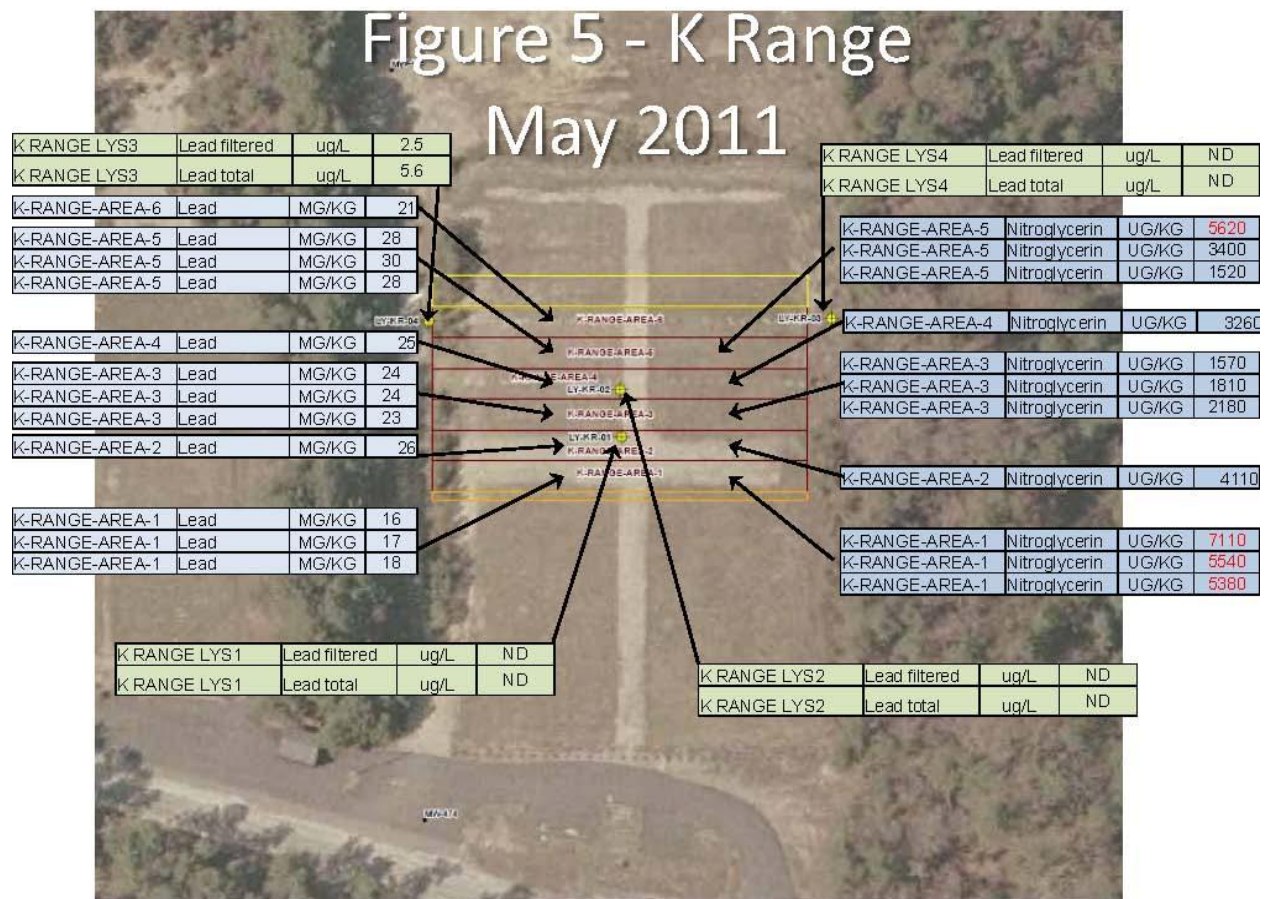
Analyte	Level 1 Sampling and Validation ¹	Level 2 Focused Reassessment ²	Level 3 Range Maintenance ³
Lead	10 ug/L	15 ug/L	30 ug/L
Copper	867 ug/L	1,300 ug/L	2,600 ug/L
Antimony	4.0 ug/L	6.0 ug/L	12 ug/L
Nitroglycerin	3.2 ug/L	4.8 ug/L	9.6 ug/L

**Table 4-3. Interim Groundwater Action Levels
for the Initial Year of Fire Operations on Juliet Range**

Analyte	Level 1 Sampling and Validation ¹	Level 2 Focused Reassessment ²	Level 3 Cease Fire and Maintenance Action ³
Lead	5.0 ug/L	7.5 ug/L	15 ug/L
Copper	434 ug/L	650 ug/L	1,300 ug/L
Antimony	2.0 ug/L	3.0 ug/L	6.0 ug/L
Nitroglycerin	1.6 ug/L	2.4 ug/L	4.8 ug/L







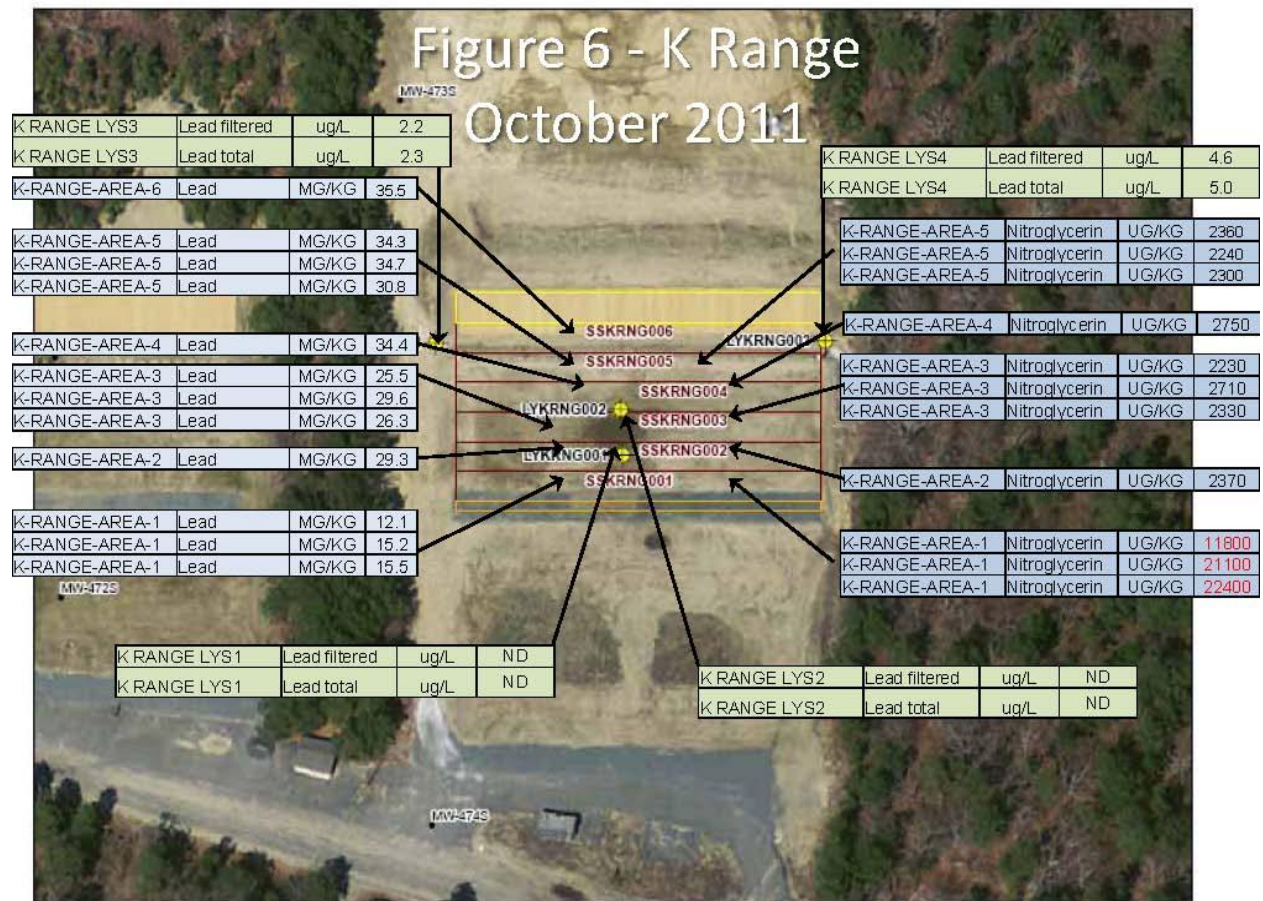


Figure 7 - T Range May 2011

T RANGE AREA 1A	Lead	MG/KG	22
T RANGE AREA 1A	Lead	MG/KG	21
T RANGE AREA 1A	Lead	MG/KG	24

T RANGE AREA 1B	Lead	MG/KG	18
T RANGE AREA 1B	Lead	MG/KG	26
T RANGE AREA 1B	Lead	MG/KG	24

T RANGE AREA 1C	Lead	MG/KG	357
T RANGE AREA 1C	Lead	MG/KG	293
T RANGE AREA 1C	Lead	MG/KG	293

T RANGE AREA 1D	Lead	MG/KG	522
T RANGE AREA 1D	Lead	MG/KG	155
T RANGE AREA 1D	Lead	MG/KG	357

T RANGE AREA 1E	Lead	MG/KG	172
T RANGE AREA 1E	Lead	MG/KG	209
T RANGE AREA 1E	Lead	MG/KG	135

T RANGE AREA 2A	Lead	MG/KG	10
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T RANGE LYS 11, 12, and 13	Lead filtered	ug/L	All ND
T RANGE LYS 11, 12, and 13	Lead total	ug/L	All ND

T RANGE AREA 1A	Nitroglycerin	UG/KG	16800
T RANGE AREA 1A	Nitroglycerin	UG/KG	12000
T RANGE AREA 1A	Nitroglycerin	UG/KG	17500

T RANGE AREA 1B	Nitroglycerin	UG/KG	3960
T RANGE AREA 1B	Nitroglycerin	UG/KG	2170
T RANGE AREA 1B	Nitroglycerin	UG/KG	3560

T RANGE AREA 1C	Nitroglycerin	UG/KG	7400
T RANGE AREA 1C	Nitroglycerin	UG/KG	3640
T RANGE AREA 1C	Nitroglycerin	UG/KG	6210

T RANGE AREA 1D	Nitroglycerin	UG/KG	8600
T RANGE AREA 1D	Nitroglycerin	UG/KG	8940
T RANGE AREA 1D	Nitroglycerin	UG/KG	15000

T RANGE AREA 1E	Nitroglycerin	UG/KG	18700
T RANGE AREA 1E	Nitroglycerin	UG/KG	13300
T RANGE AREA 1E	Nitroglycerin	UG/KG	16900

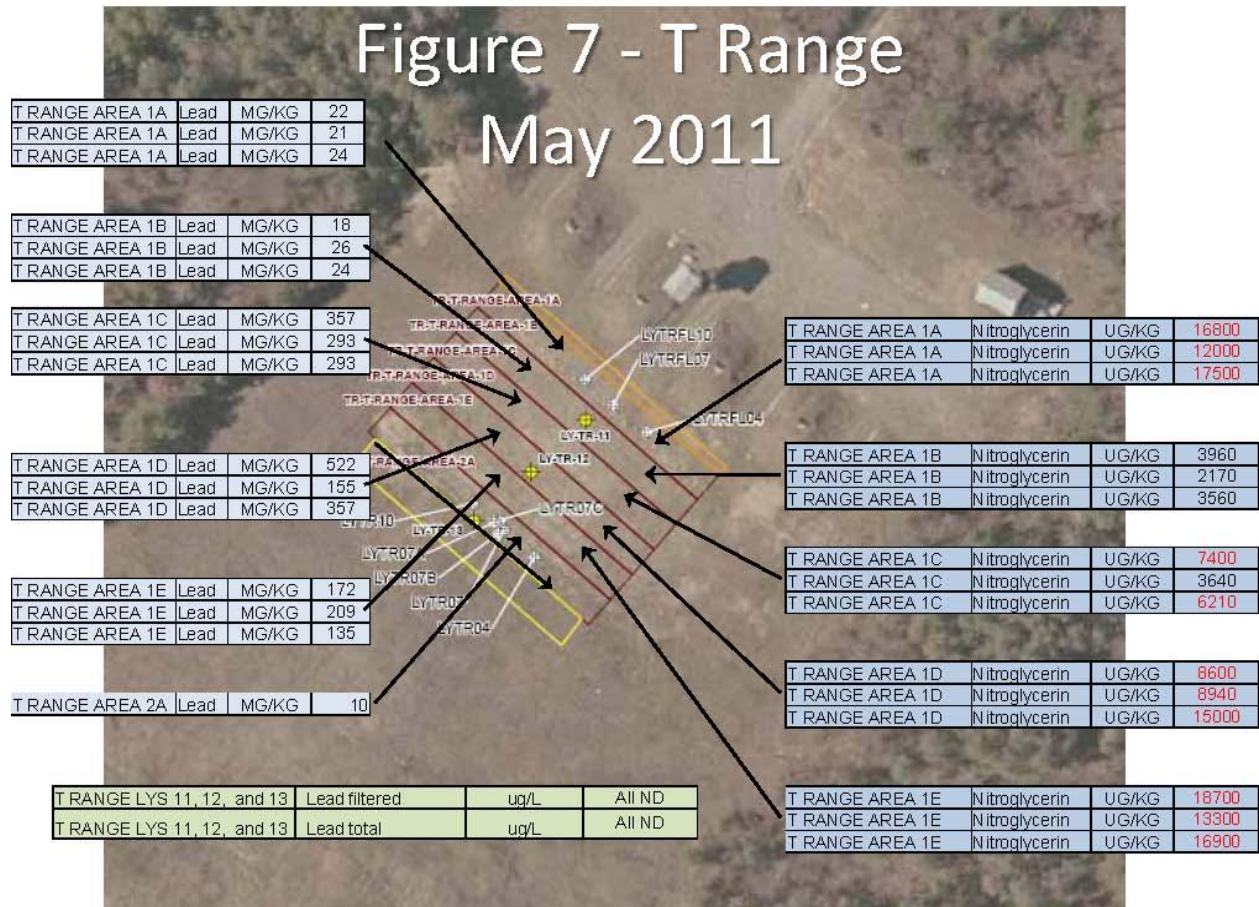


Figure 8 - T Range October 2011

T RANGE AREA 1A	Lead	MG/KG	23.9
T RANGE AREA 1A	Lead	MG/KG	23.4
T RANGE AREA 1A	Lead	MG/KG	22.1

T RANGE AREA 1B	Lead	MG/KG	20.1
T RANGE AREA 1B	Lead	MG/KG	20.8
T RANGE AREA 1B	Lead	MG/KG	25.6

T RANGE AREA 1C	Lead	MG/KG	418
T RANGE AREA 1C	Lead	MG/KG	387
T RANGE AREA 1C	Lead	MG/KG	439

T RANGE AREA 1D	Lead	MG/KG	257
T RANGE AREA 1D	Lead	MG/KG	314
T RANGE AREA 1D	Lead	MG/KG	385

T RANGE AREA 1E	Lead	MG/KG	378
T RANGE AREA 1E	Lead	MG/KG	319
T RANGE AREA 1E	Lead	MG/KG	260

T RANGE AREA 2A	Lead	MG/KG	20.3
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T RANGE LYS 11, 12, and 13	Lead filtered	ug/L	All ND
T RANGE LYS 11, 12, and 13	Lead total	ug/L	All ND

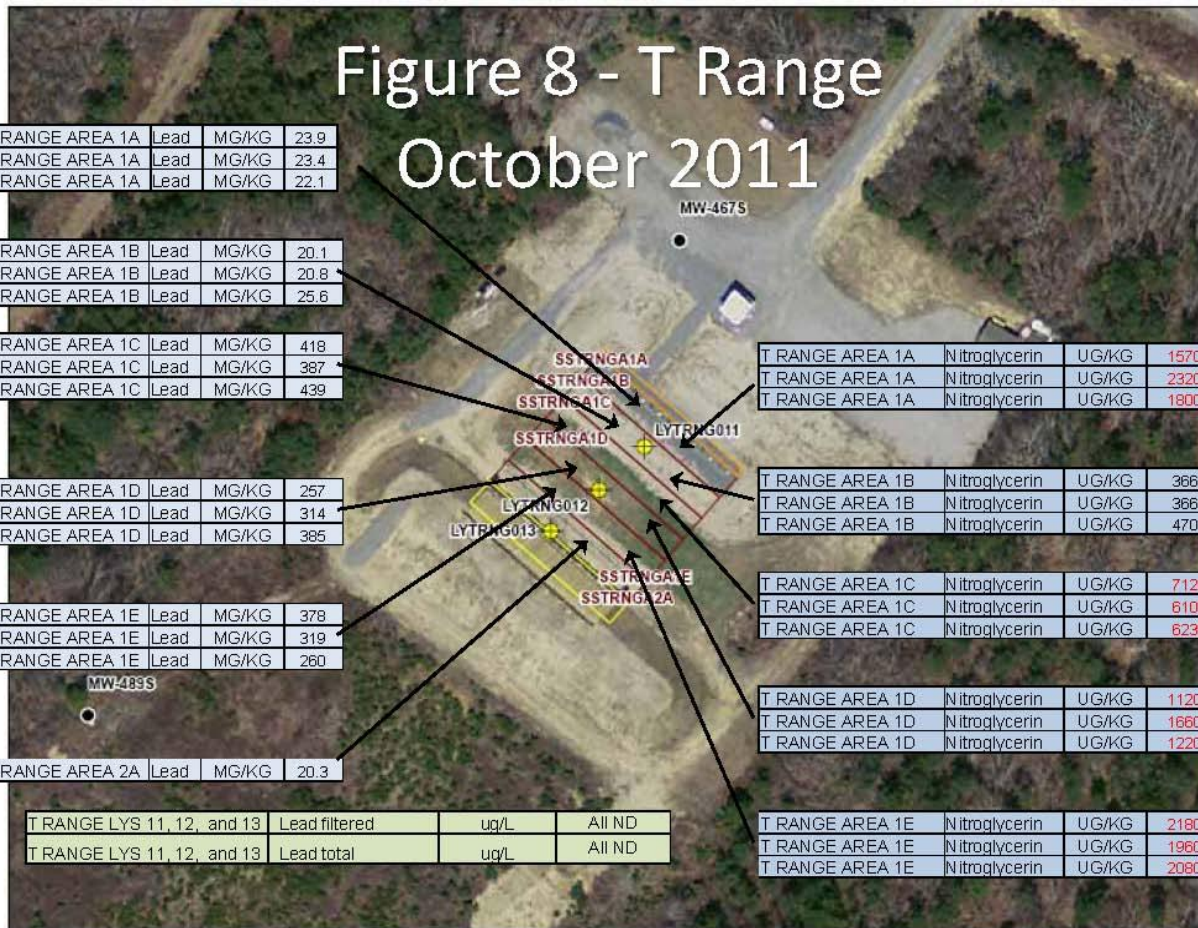
T RANGE AREA 1A	Nitroglycerin	UG/KG	15700
T RANGE AREA 1A	Nitroglycerin	UG/KG	23200
T RANGE AREA 1A	Nitroglycerin	UG/KG	18000

T RANGE AREA 1B	Nitroglycerin	UG/KG	3660
T RANGE AREA 1B	Nitroglycerin	UG/KG	3660
T RANGE AREA 1B	Nitroglycerin	UG/KG	4700

T RANGE AREA 1C	Nitroglycerin	UG/KG	7120
T RANGE AREA 1C	Nitroglycerin	UG/KG	8100
T RANGE AREA 1C	Nitroglycerin	UG/KG	6230

T RANGE AREA 1D	Nitroglycerin	UG/KG	11200
T RANGE AREA 1D	Nitroglycerin	UG/KG	16600
T RANGE AREA 1D	Nitroglycerin	UG/KG	12200

T RANGE AREA 1E	Nitroglycerin	UG/KG	21800
T RANGE AREA 1E	Nitroglycerin	UG/KG	19600
T RANGE AREA 1E	Nitroglycerin	UG/KG	20800



Attachment 1

**J, K, and T Ranges Sampling and Analysis
Data Report
By TetraTech
July 2011**

Draft
J, K and T Ranges Sampling and Analysis
Data Report

Massachusetts Military Reservation
Cape Cod, Massachusetts

July 2011

Prepared for:

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts
for
Massachusetts Army National Guard
Camp Edwards, Massachusetts

Prepared by:

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Contract No. DACW33-03-D-0006

Draft J, K and T Ranges Sampling and Analysis Data Report
July 13, 2011

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- Figure 2. K Range Sampling Locations
- Figure 3. T Range Sampling Locations

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1.0 FIELD ACTIVITIES SUMMARY

Field activities were initiated on May 23, 2011 in accordance with the *Scope of Work: J, K, and T Ranges Environmental Sampling, Spring 2011* Project Note (dated April 14, 2011). The project note summarizes the approved modifications to the Operations Maintenance and Monitoring/Best Management Practices Plans for the Juliet Range, Kilo Range and Tango Ranges. All samples were submitted to Test America Laboratory, Inc. in Burlington, Vermont for analysis. Results from the May 2011 sampling events are presented in data tables organized by Range and matrix in Appendix A.

1.1 Juliet Range

Multi-increment soil (MIS) samples were collected from six equal-sized grids (Areas 1 through 6) 5-meters wide and the full length of the firing line extending along the range floor from the firing line to the berm as shown in Figure 1.

One hundred point multi increment samples were collected from depth of 0 to 3 inches below ground surface (bgs) on May 26, 2011. Two replicate 100-point samples were also collected from Areas 1, 3 and 5. All samples were ground and processed in accordance with CRREL procedures. Samples collected from Areas 1 through 5 were submitted for lead, copper, zinc, and antimony analyses via Method 3050B/6010B, tungsten analysis via Method 6020 and nitroglycerin analysis via Method 8330B. The sample collected from Area 6 was submitted for lead, copper, zinc, and antimony analyses via Method 3050B/6010B and tungsten analysis via Method 6020.

Purge water samples were collected from three pan lysimeters (LYJRNG01, LYJRNG02 and LYJRNG03) on May 25 and 26, 2011. There was not sufficient rainfall during the following week to allow the collection of "fresh" water so the purge water samples were submitted for analysis. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Figure 1 shows locations of the pan lysimeters.

Groundwater samples were collected from two monitoring wells MW-471S and MW-472S on May 24 and 25, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Field duplicate samples were collected and submitted from MW-471S. Groundwater sample locations are shown on Figure 1.

A sample was collected from the STAPP system run off by the MAARNG on April 15, 2011 and submitted for TAL metals analysis by Method 3050B/6010B and tungsten analysis by Method 6020.

1.2 Kilo Range

Multi-increment soil (MIS) samples were collected from six equal-sized grids (Areas 1 through 6) 5-meters wide and the full length of the firing line extending along the range floor from the firing line to the berm as shown in Figure 2.

One hundred point multi increment samples were collected from depth of 0 to 3 inches below ground surface (bgs) on May 27 and 31, 2011. Two replicate 100-point samples were also collected from Areas 1, 3 and 5. All samples were ground and processed in accordance with CRREL procedures. Samples collected from Areas 1 through 5 were submitted for lead, copper, zinc, and antimony analyses via Method 3050B/6010B, tungsten analysis via Method 6020 and nitroglycerin analysis via Method 8330B. The sample collected from Area 6 was submitted for lead, copper, zinc, and antimony analyses via Method 3050B/6010B and tungsten analysis via Method 6020.

Purge water samples were collected from four pan lysimeters (LYKRNG01, LYKRNG02, LYKRNG03 and LYKRNG004) on May 26, 2011. There was not sufficient rainfall during the following week to allow the collection of "fresh" water so the purge water samples were submitted for analysis. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Field duplicate samples were collected and submitted from LYKRNG001. Figure 2 shows locations of the pan lysimeters.

Groundwater samples were collected from two monitoring wells MW-473S and MW-474S on May 24 and 25, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Groundwater sample locations are shown on Figure 2.

A sample was collected from the STAPP system run off by the MAARNG on April 15, 2011 and submitted for TAL metals analysis by Method 3050B/6010B and tungsten analysis by Method 6020.

1.3 Tango Range

Multi-increment soil (MIS) samples were collected from six equal-sized grids (Areas 1A through 1E and Area 2A) 5-meters wide and the full length of the firing line extending along the range floor from the firing line to the berm as shown in Figure 3.

One hundred point multi increment samples were collected from depth of 0 to 3 inches below ground surface (bgs) on May 23, 2011. Two replicate 100-point samples were also collected from each of the range floor areas (Areas 1A through 1E). All samples were ground and processed in accordance with CRREL procedures. Samples collected from Areas 1A through 1E were submitted for lead, copper, zinc, and antimony analyses via Method 3050B/6010B, tungsten analysis via Method 6020 and nitroglycerin analysis via Method 8330B. The sample collected from Area 2A was submitted for lead, copper, zinc, and antimony analyses via Method 3050B/6010B and tungsten analysis via Method 6020.

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Purge water samples were collected from three pan lysimeters (LYTRNG011, LYTRNG012, and LYTRNG013) on May 24, 2011. There was not sufficient rainfall during the following week to allow the collection of "fresh" water so the purge water samples were submitted for analysis. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Figure 3 shows locations of the pan lysimeters.

Groundwater samples were collected from two monitoring wells MW-467S and MW-489S on May 24, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Groundwater sample locations are shown on Figure 3.

2.0 SUMMARY

All samples have been collected as planned and the data has been reviewed and validated in accordance with standard procedures. Sample results have been compared to Level 1 Interim Action Levels for antimony, lead, copper and nitroglycerin in soil, pore water and groundwater samples. Analytical data tables are presented by Range and matrix in Appendix A.

The lead and antimony results from the multi incremental soil samples collected from all ranges were less than the action levels of 4,545 mg/kg and 1,750 mg/kg, respectively. The results for nitroglycerin in the MIS samples collected from the Area 1 at the J and K Ranges, Area 5 at the K Range and Areas 1A, 1C, 1D and 1E at the T Range exceeded the action level of 5,000 µg/kg. The soil sample results for each range are presented in Tables 1, 4 and 7.

The lead, antimony and copper results from the lysimeter samples collected from all ranges were less than the action levels of 10 µg/L, 4.0 µg/L and 867 µg/L, respectively. The action level for nitroglycerin in pore water was 3.2 µg/L; the results for nitroglycerin in the lysimeter samples from all ranges were non-detect at 2 µg/L. The lysimeter sample results are presented in Tables 2, 5 and 8.

The lead, antimony and copper results from the groundwater samples collected from all ranges were less than the action levels of 5.0 µg/L, 2.0 µg/L and 434 µg/L, respectively. The action level for nitroglycerin in groundwater was 1.6 µg/L; the results for nitroglycerin in the groundwater samples from all ranges were non-detect at 2 µg/L with a method detection limit of 0.6 µg/L. The groundwater sample results are presented in Tables 3, 6 and 9.

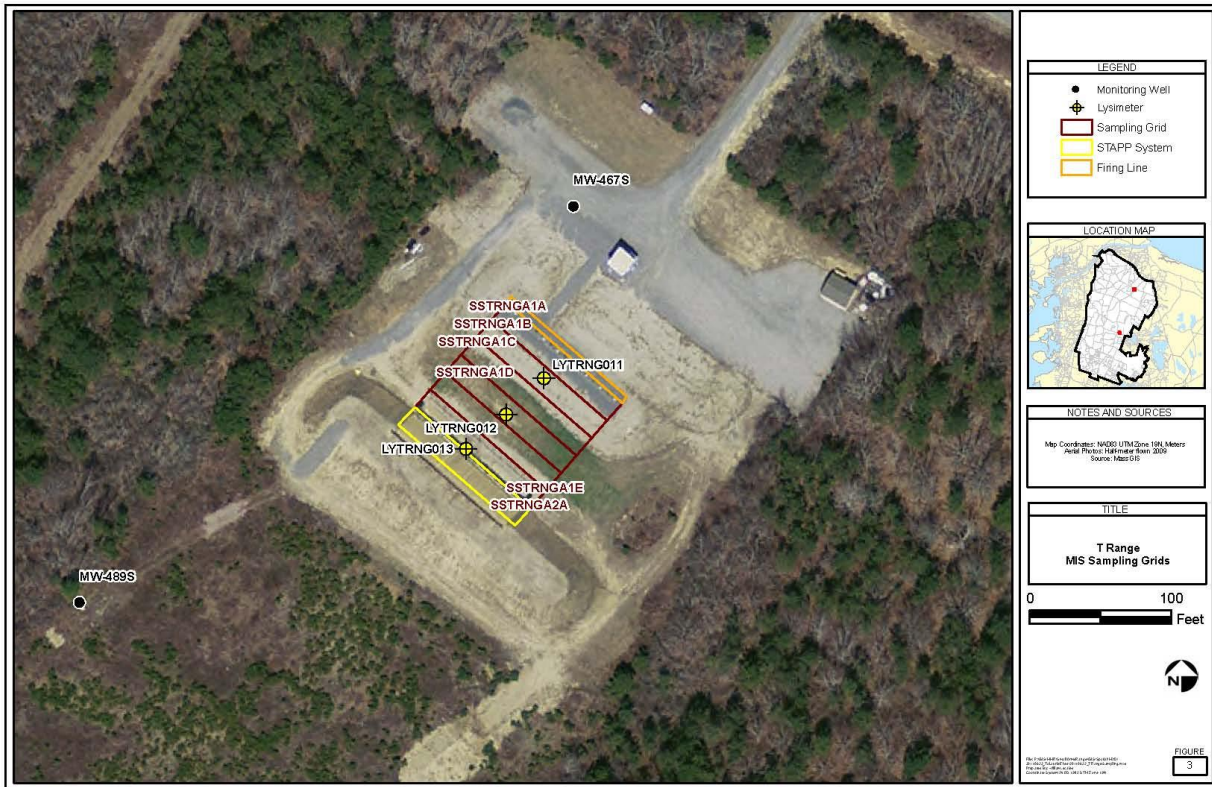
There are no action levels for the STAPP sample results; results are presented in Table 10.

The data are usable for project related decisions.

FIGURES







APPENDIX A
Data Tables

Table 1
J Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
J RANGE	SSJRN001	SSJRN001_A	4616341.33	371958.87	05/26/2011	SW6010B	Copper	15.8		Mg/Kg	0.078	1.2	N1
J RANGE	SSJRN001	SSJRN001_A	4616341.33	371958.87	05/26/2011	SW6010B	Lead	22.6		Mg/Kg	0.11	0.49	N1
J RANGE	SSJRN001	SSJRN001_A	4616341.33	371958.87	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	2.9	N1
J RANGE	SSJRN001	SSJRN001_A	4616341.33	371958.87	05/26/2011	SW6010B	Zinc	31.9		Mg/Kg	0.029	0.88	N1
J RANGE	SSJRN001	SSJRN001_A	4616341.33	371958.87	05/26/2011	SW6020	Tungsten	ND	U	Mg/Kg	0.011	0.16	N1
J RANGE	SSJRN001	SSJRN001_A	4616341.33	371958.87	05/26/2011	SW6330	Nitroglycerin	6260		UG/Kg	608	1980	N1
J RANGE	SSJRN001	SSJRN001_B	4616341.33	371958.87	05/26/2011	SW6010B	Copper	15.8		Mg/Kg	0.079	1.2	FR1
J RANGE	SSJRN001	SSJRN001_B	4616341.33	371958.87	05/26/2011	SW6010B	Lead	32.1		Mg/Kg	0.11	0.50	FR1
J RANGE	SSJRN001	SSJRN001_B	4616341.33	371958.87	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	3.0	FR1
J RANGE	SSJRN001	SSJRN001_B	4616341.33	371958.87	05/26/2011	SW6010B	Zinc	30.9		Mg/Kg	0.030	0.99	FR1
J RANGE	SSJRN001	SSJRN001_B	4616341.33	371958.87	05/26/2011	SW6020	Tungsten	ND	U	UG/Kg	0.011	0.18	FR1
J RANGE	SSJRN001	SSJRN001_B	4616341.33	371958.87	05/26/2011	SW6330	Nitroglycerin	11100		UG/Kg	608	1980	FR1
J RANGE	SSJRN001	SSJRN001_C	4616341.33	371958.87	05/26/2011	SW6010B	Copper	14.5		Mg/Kg	0.080	1.2	FR1
J RANGE	SSJRN001	SSJRN001_C	4616341.33	371958.87	05/26/2011	SW6010B	Lead	34.3		Mg/Kg	0.11	0.50	FR1
J RANGE	SSJRN001	SSJRN001_C	4616341.33	371958.87	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	3.0	FR1
J RANGE	SSJRN001	SSJRN001_C	4616341.33	371958.87	05/26/2011	SW6010B	Zinc	29.4		Mg/Kg	0.030	1.0	FR1
J RANGE	SSJRN001	SSJRN001_C	4616341.33	371958.87	05/26/2011	SW6020	Tungsten	ND	U	Mg/Kg	0.012	0.16	FR1
J RANGE	SSJRN001	SSJRN001_C	4616341.33	371958.87	05/26/2011	SW6330	Nitroglycerin	9080		UG/Kg	601	1980	FR1
J RANGE	SSJRN002	SSJRN002_A	4616345.37	371959.24	05/26/2011	SW6010B	Lead	42.3		Mg/Kg	0.11	0.50	N1
J RANGE	SSJRN002	SSJRN002_A	4616345.37	371959.24	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	3.0	N1
J RANGE	SSJRN002	SSJRN002_A	4616345.37	371959.24	05/26/2011	SW6010B	Copper	ND	U	Mg/Kg	0.080	8.0	N1
J RANGE	SSJRN002	SSJRN002_A	4616345.37	371959.24	05/26/2011	SW6010B	Zinc	21.6		Mg/Kg	0.030	1.0	N1
J RANGE	SSJRN002	SSJRN002_A	4616345.37	371959.24	05/26/2011	SW6020	Tungsten	ND	U	Mg/Kg	0.011	0.14	N1
J RANGE	SSJRN002	SSJRN002_A	4616345.37	371959.24	05/26/2011	SW6330	Nitroglycerin	1900		UG/Kg	603	1970	N1
J RANGE	SSJRN003	SSJRN003_A	4616350.92	371959.2	05/26/2011	SW6010B	Lead	56.0		Mg/Kg	0.11	0.51	N1
J RANGE	SSJRN003	SSJRN003_A	4616350.92	371959.2	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	3.0	N1
J RANGE	SSJRN003	SSJRN003_A	4616350.92	371959.2	05/26/2011	SW6010B	Copper	ND	U	Mg/Kg	0.081	9.2	N1
J RANGE	SSJRN003	SSJRN003_A	4616350.92	371959.2	05/26/2011	SW6010B	Zinc	23.0		Mg/Kg	0.030	1.0	N1
J RANGE	SSJRN003	SSJRN003_A	4616350.92	371959.2	05/26/2011	SW6020	Tungsten	ND	U	Mg/Kg	0.012	0.16	N1
J RANGE	SSJRN003	SSJRN003_A	4616350.92	371959.2	05/26/2011	SW6330	Nitroglycerin	1430		UG/Kg	624	2040	N1
J RANGE	SSJRN003	SSJRN003_B	4616350.92	371959.2	05/26/2011	SW6010B	Copper	11.2		Mg/Kg	0.080	1.2	FR1
J RANGE	SSJRN003	SSJRN003_B	4616350.92	371959.2	05/26/2011	SW6010B	Lead	192		Mg/Kg	0.11	0.50	FR1
J RANGE	SSJRN003	SSJRN003_B	4616350.92	371959.2	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	3.0	FR1
J RANGE	SSJRN003	SSJRN003_B	4616350.92	371959.2	05/26/2011	SW6010B	Zinc	21.9		Mg/Kg	0.030	1.0	FR1
J RANGE	SSJRN003	SSJRN003_B	4616350.92	371959.2	05/26/2011	SW6020	Tungsten	ND	U	Mg/Kg	0.011	0.28	FR1
J RANGE	SSJRN003	SSJRN003_B	4616350.92	371959.2	05/26/2011	SW6330	Nitroglycerin	2770		UG/Kg	616	2010	FR1
J RANGE	SSJRN003	SSJRN003_C	4616350.92	371959.2	05/26/2011	SW6010B	Lead	48.8		Mg/Kg	0.11	0.50	FR1
J RANGE	SSJRN003	SSJRN003_C	4616350.92	371959.2	05/26/2011	SW6010B	Antimony	ND	U	Mg/Kg	0.19	3.0	FR1
J RANGE	SSJRN003	SSJRN003_C	4616350.92	371959.2	05/26/2011	SW6010B	Copper	ND	U	Mg/Kg	0.080	8.9	FR1
J RANGE	SSJRN003	SSJRN003_C	4616350.92	371959.2	05/26/2011	SW6010B	Zinc	21.7		Mg/Kg	0.030	1.0	FR1
J RANGE	SSJRN003	SSJRN003_C	4616350.92	371959.2	05/26/2011	SW6020	Tungsten	ND	U	Mg/Kg	0.012	0.16	FR1
J RANGE	SSJRN003	SSJRN003_C	4616350.92	371959.2	05/26/2011	SW6330	Nitroglycerin	2000		UG/Kg	613	2000	FR1

Table1_A7_JKTRangeSoilData.xlsx

Table 1
J Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
J RANGE	SSJRN G004	SSJRN G004_A	4616366.64	371959.22	05/26/2011	SW60108	Lead	51.8		MG/KG	0.11	0.51	N1
J RANGE	SSJRN G004	SSJRN G004_A	4616366.64	371959.22	05/26/2011	SW60108	Antimony	ND	U	MG/KG	0.19	3.0	N1
J RANGE	SSJRN G004	SSJRN G004_A	4616366.64	371959.22	05/26/2011	SW60108	Copper	ND	U	MG/KG	0.081	7.1	N1
J RANGE	SSJRN G004	SSJRN G004_A	4616366.64	371959.22	05/26/2011	SW60108	Zinc	22.2		MG/KG	0.030	1.0	N1
J RANGE	SSJRN G004	SSJRN G004_A	4616366.64	371959.22	05/26/2011	SW6020	Tungsten	ND	U	MG/KG	0.012	0.12	N1
J RANGE	SSJRN G004	SSJRN G004_A	4616366.64	371959.22	05/26/2011	SV6330	Nitroglycerin	1960	J	UG/KG	596	1950	N1
J RANGE	SSJRN G005	SSJRN G005_A	4616362.08	371959.17	05/26/2011	SW60108	Lead	37.3		MG/KG	0.11	0.50	N1
J RANGE	SSJRN G005	SSJRN G005_A	4616362.08	371959.17	05/26/2011	SW60108	Antimony	ND	U	MG/KG	0.19	3.0	N1
J RANGE	SSJRN G005	SSJRN G005_A	4616362.08	371959.17	05/26/2011	SW60108	Copper	ND	U	MG/KG	0.080	8.8	N1
J RANGE	SSJRN G005	SSJRN G005_A	4616362.08	371959.17	05/26/2011	SW60108	Zinc	22.3		MG/KG	0.030	1.0	N1
J RANGE	SSJRN G005	SSJRN G005_A	4616362.08	371959.17	05/26/2011	SW6020	Tungsten	ND	U	MG/KG	0.012	0.23	N1
J RANGE	SSJRN G005	SSJRN G005_A	4616362.08	371959.17	05/26/2011	SV6330	Nitroglycerin	1220	J	UG/KG	592	1940	N1
J RANGE	SSJRN G005	SSJRN G005_B	4616362.08	371959.17	05/26/2011	SW60108	Lead	37.1		MG/KG	0.11	0.50	FR1
J RANGE	SSJRN G005	SSJRN G005_B	4616362.08	371959.17	05/26/2011	SW60108	Antimony	ND	U	MG/KG	0.19	3.0	FR1
J RANGE	SSJRN G005	SSJRN G005_B	4616362.08	371959.17	05/26/2011	SW60108	Copper	ND	U	MG/KG	0.080	7.1	FR1
J RANGE	SSJRN G005	SSJRN G005_B	4616362.08	371959.17	05/26/2011	SW60108	Zinc	22.5		MG/KG	0.030	1.0	FR1
J RANGE	SSJRN G005	SSJRN G005_B	4616362.08	371959.17	05/26/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.13	FR1
J RANGE	SSJRN G005	SSJRN G005_B	4616362.08	371959.17	05/26/2011	SV6330	Nitroglycerin	1220	J	UG/KG	594	1940	FR1
J RANGE	SSJRN G005	SSJRN G005_C	4616362.08	371959.17	05/26/2011	SW60108	Lead	49.0		MG/KG	0.11	0.49	FR1
J RANGE	SSJRN G005	SSJRN G005_C	4616362.08	371959.17	05/26/2011	SW60108	Antimony	ND	U	MG/KG	0.19	2.9	FR1
J RANGE	SSJRN G005	SSJRN G005_C	4616362.08	371959.17	05/26/2011	SW60108	Copper	ND	U	MG/KG	0.078	7.8	FR1
J RANGE	SSJRN G005	SSJRN G005_C	4616362.08	371959.17	05/26/2011	SW60108	Zinc	22.6		MG/KG	0.029	0.98	FR1
J RANGE	SSJRN G005	SSJRN G005_C	4616362.08	371959.17	05/26/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.15	FR1
J RANGE	SSJRN G005	SSJRN G005_C	4616362.08	371959.17	05/26/2011	SV6330	Nitroglycerin	1810	J	UG/KG	607	1980	FR1
J RANGE	SSJRN G006	SSJRN G006_A	4616366.26	371958.99	05/26/2011	SW60108	Lead	28.6		MG/KG	0.11	0.50	N1
J RANGE	SSJRN G006	SSJRN G006_A	4616366.26	371958.99	05/26/2011	SW60108	Antimony	ND	U	MG/KG	0.19	3.0	N1
J RANGE	SSJRN G006	SSJRN G006_A	4616366.26	371958.99	05/26/2011	SW60108	Copper	ND	U	MG/KG	0.080	6.8	N1
J RANGE	SSJRN G006	SSJRN G006_A	4616366.26	371958.99	05/26/2011	SW60108	Zinc	44.1		MG/KG	0.030	1.0	N1
J RANGE	SSJRN G006	SSJRN G006_A	4616366.26	371958.99	05/26/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.33	N1

Notes:

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Tables147_JRangeSoilDataTables.xlsx

Table 2
J Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
J RANGE	LYJRN001	LYJRN001FA	4616347.89	371959.96	05/25/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	LYJRN001	LYJRN001FA	4616347.89	371959.96	05/25/2011	SW6020	FLDFLT	Copper	1.2	J	UG/L	0.89	20.0
J RANGE	LYJRN001	LYJRN001FA	4616347.89	371959.96	05/25/2011	SW6020	FLDFLT	Lead	3.4		UG/L	0.035	2.0
J RANGE	LYJRN001	LYJRN001FA	4616347.89	371959.96	05/25/2011	SW6020	FLDFLT	Zinc	1.6	J	UG/L	0.86	20.0
J RANGE	LYJRN001	LYJRN001UA	4616347.89	371959.96	05/25/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	LYJRN001	LYJRN001UA	4616347.89	371959.96	05/25/2011	SW6020	TOTAL	Copper	1.6	J	UG/L	0.89	20.0
J RANGE	LYJRN001	LYJRN001UA	4616347.89	371959.96	05/25/2011	SW6020	TOTAL	Lead	5.0		UG/L	0.035	2.0
J RANGE	LYJRN001	LYJRN001UA	4616347.89	371959.96	05/25/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
J RANGE	LYJRN001	LYJRN001UA	4616347.89	371959.96	05/25/2011	SW6020	TOTAL	Zinc	5.9	J	UG/L	0.86	20.0
J RANGE	LYJRN002	LYJRN002FA	4616355.88	371960.05	05/25/2011	SW6330	METHOD	Nitroglycerin	ND	UJ	UG/L	0.60	2.0
J RANGE	LYJRN002	LYJRN002FA	4616355.88	371960.05	05/25/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	LYJRN002	LYJRN002FA	4616355.88	371960.05	05/25/2011	SW6020	FLDFLT	Copper	ND	U	UG/L	0.89	20.0
J RANGE	LYJRN002	LYJRN002FA	4616355.88	371960.05	05/25/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.035	2.1
J RANGE	LYJRN002	LYJRN002FA	4616355.88	371960.05	05/25/2011	SW6020	FLDFLT	Zinc	4.2	J	UG/L	0.86	20.0
J RANGE	LYJRN002	LYJRN002UA	4616355.88	371960.05	05/25/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	LYJRN002	LYJRN002UA	4616355.88	371960.05	05/25/2011	SW6020	TOTAL	Copper	1.0	J	UG/L	0.89	20.0
J RANGE	LYJRN002	LYJRN002UA	4616355.88	371960.05	05/25/2011	SW6020	TOTAL	Lead	4.4		UG/L	0.035	2.0
J RANGE	LYJRN002	LYJRN002UA	4616355.88	371960.05	05/25/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
J RANGE	LYJRN002	LYJRN002UA	4616355.88	371960.05	05/25/2011	SW6020	TOTAL	Zinc	3.4	J	UG/L	0.86	20.0
J RANGE	LYJRN002	LYJRN002UA	4616355.88	371960.05	05/25/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
J RANGE	LYJRN003	LYJRN003FA	4616368	371939.92	05/26/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	LYJRN003	LYJRN003FA	4616368	371939.92	05/26/2011	SW6020	FLDFLT	Copper	3.0	J	UG/L	0.89	20.0
J RANGE	LYJRN003	LYJRN003FA	4616368	371939.92	05/26/2011	SW6020	FLDFLT	Lead	2.7		UG/L	0.035	2.0
J RANGE	LYJRN003	LYJRN003FA	4616368	371939.92	05/26/2011	SW6020	FLDFLT	Zinc	3.5	J	UG/L	0.86	20.0
J RANGE	LYJRN003	LYJRN003UA	4616368	371939.92	05/26/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	LYJRN003	LYJRN003UA	4616368	371939.92	05/26/2011	SW6020	TOTAL	Copper	3.8	J	UG/L	0.89	20.0
J RANGE	LYJRN003	LYJRN003UA	4616368	371939.92	05/26/2011	SW6020	TOTAL	Lead	9.0		UG/L	0.035	2.0
J RANGE	LYJRN003	LYJRN003UA	4616368	371939.92	05/26/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
J RANGE	LYJRN003	LYJRN003UA	4616368	371939.92	05/26/2011	SW6020	TOTAL	Zinc	8.3	J	UG/L	0.86	20.0
J RANGE	LYJRN003	LYJRN003UA	4616368	371939.92	05/26/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0

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Table 3
J Range Validated Groundwater Data

Site ID	Location ID	Field Sample ID	Top depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
J RANGE	MW-471S	MW-471S_MAY11FA	84.59	94.59	05/25/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	MW-471S	MW-471S_MAY11FA	84.59	94.59	05/25/2011	SW6020	FLDFLT	Copper	ND	U	UG/L	0.89	20.0
J RANGE	MW-471S	MW-471S_MAY11FA	84.59	94.59	05/25/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.51	2.0
J RANGE	MW-471S	MW-471S_MAY11FA	84.59	94.59	05/25/2011	SW6020	FLDFLT	Zinc	3.0	J	UG/L	0.86	20.0
J RANGE	MW-471S	MW-471S_MAY11FD	84.59	94.59	05/25/2011	SW6020	FLDFLT	Copper	1.0	J	UG/L	0.89	20.0
J RANGE	MW-471S	MW-471S_MAY11FD	84.59	94.59	05/25/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.8	20.0
J RANGE	MW-471S	MW-471S_MAY11FD	84.59	94.59	05/25/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.43	2.0
J RANGE	MW-471S	MW-471S_MAY11FD	84.59	94.59	05/25/2011	SW6020	FLDFLT	Zinc	2.7	J	UG/L	0.86	20.0
J RANGE	MW-471S	MW-471S_MAY11UA	84.59	94.59	05/25/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
J RANGE	MW-471S	MW-471S_MAY11UA	84.59	94.59	05/25/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.8	20.0
J RANGE	MW-471S	MW-471S_MAY11UA	84.59	94.59	05/25/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
J RANGE	MW-471S	MW-471S_MAY11UA	84.59	94.59	05/25/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.42	2.0
J RANGE	MW-471S	MW-471S_MAY11UA	84.59	94.59	05/25/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6020	TOTAL	Zinc	2.8	J	UG/L	0.86	20.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.8	20.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.41	2.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
J RANGE	MW-471S	MW-471S_MAY11UD	84.59	94.59	05/25/2011	SW6020	TOTAL	Zinc	2.1	J	UG/L	0.86	20.0
J RANGE	MW-472S	MW-472S_MAY11FA	85.31	95.31	05/24/2011	SW6020	FLDFLT	Copper	1.9	J	UG/L	0.89	20.0
J RANGE	MW-472S	MW-472S_MAY11FA	85.31	95.31	05/24/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	MW-472S	MW-472S_MAY11FA	85.31	95.31	05/24/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.28	2.0
J RANGE	MW-472S	MW-472S_MAY11FA	85.31	95.31	05/24/2011	SW6020	FLDFLT	Zinc	5.0	J	UG/L	0.86	20.0
J RANGE	MW-472S	MW-472S_MAY11UA	85.31	95.31	05/24/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
J RANGE	MW-472S	MW-472S_MAY11UA	85.31	95.31	05/24/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
J RANGE	MW-472S	MW-472S_MAY11UA	85.31	95.31	05/24/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
J RANGE	MW-472S	MW-472S_MAY11UA	85.31	95.31	05/24/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.30	2.0
J RANGE	MW-472S	MW-472S_MAY11UA	85.31	95.31	05/24/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
J RANGE	MW-472S	MW-472S_MAY11UA	85.31	95.31	05/24/2011	SW6020	TOTAL	Zinc	4.1	J	UG/L	0.86	20.0

Notes:

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J Range

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Table 4
K Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
K RANGE	SSKRN001	SSKRN001_A	4616341.71	372041.94	05/27/2011	SW6010B	Copper	19.5		MG/KG	0.080	1.2	N1
K RANGE	SSKRN001	SSKRN001_A	4616341.71	372041.94	05/27/2011	SW6010B	Lead	15.6		MG/KG	0.11	0.50	N1
K RANGE	SSKRN001	SSKRN001_A	4616341.71	372041.94	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
K RANGE	SSKRN001	SSKRN001_A	4616341.71	372041.94	05/27/2011	SW6010B	Zinc	25.6		MG/KG	0.030	1.0	N1
K RANGE	SSKRN001	SSKRN001_A	4616341.71	372041.94	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.012	0.14	N1
K RANGE	SSKRN001	SSKRN001_A	4616341.71	372041.94	05/27/2011	SW8330	Nitroglycerin	7110		UG/KG	808	1980	N1
K RANGE	SSKRN001	SSKRN001_B	4616341.71	372041.94	05/27/2011	SW6010B	Copper	19.5		MG/KG	0.078	1.2	FR1
K RANGE	SSKRN001	SSKRN001_B	4616341.71	372041.94	05/27/2011	SW6010B	Lead	16.8		MG/KG	0.11	0.49	FR1
K RANGE	SSKRN001	SSKRN001_B	4616341.71	372041.94	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
K RANGE	SSKRN001	SSKRN001_B	4616341.71	372041.94	05/27/2011	SW6010B	Zinc	26.4		MG/KG	0.029	0.98	FR1
K RANGE	SSKRN001	SSKRN001_B	4616341.71	372041.94	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.12	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW8330	Nitroglycerin	5540	J	UG/KG	810	1980	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW6010B	Copper	20.2		MG/KG	0.079	1.2	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW6010B	Lead	17.5		MG/KG	0.11	0.50	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW6010B	Zinc	26.2		MG/KG	0.030	0.99	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.15	FR1
K RANGE	SSKRN001	SSKRN001_C	4616341.71	372041.94	05/27/2011	SW8330	Nitroglycerin	5380	J	UG/KG	598	1980	FR1
K RANGE	SSKRN002	SSKRN002_A	4616346.08	372042.19	05/27/2011	SW6010B	Lead	25.7		MG/KG	0.11	0.50	N1
K RANGE	SSKRN002	SSKRN002_A	4616346.08	372042.19	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
K RANGE	SSKRN002	SSKRN002_A	4616346.08	372042.19	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.079	8.7	N1
K RANGE	SSKRN002	SSKRN002_A	4616346.08	372042.19	05/27/2011	SW6010B	Zinc	18.1		MG/KG	0.030	0.99	N1
K RANGE	SSKRN002	SSKRN002_A	4616346.08	372042.19	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.15	N1
K RANGE	SSKRN002	SSKRN002_A	4616346.08	372042.19	05/27/2011	SW8330	Nitroglycerin	4110	J	UG/KG	587	1920	N1
K RANGE	SSKRN003	SSKRN003_A	4616351.28	372042.4	05/27/2011	SW6010B	Lead	23.8		MG/KG	0.11	0.52	N1
K RANGE	SSKRN003	SSKRN003_A	4616351.28	372042.4	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.20	3.1	N1
K RANGE	SSKRN003	SSKRN003_A	4616351.28	372042.4	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.082	8.5	N1
K RANGE	SSKRN003	SSKRN003_A	4616351.28	372042.4	05/27/2011	SW6010B	Zinc	16.4		MG/KG	0.031	1.0	N1
K RANGE	SSKRN003	SSKRN003_A	4616351.28	372042.4	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.012	0.12	N1
K RANGE	SSKRN003	SSKRN003_A	4616351.28	372042.4	05/27/2011	SW8330	Nitroglycerin	1570	J	UG/KG	611	2000	N1
K RANGE	SSKRN003	SSKRN003_B	4616351.28	372042.4	05/27/2011	SW6010B	Lead	24.0		MG/KG	0.11	0.49	FR1
K RANGE	SSKRN003	SSKRN003_B	4616351.28	372042.4	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
K RANGE	SSKRN003	SSKRN003_B	4616351.28	372042.4	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.078	7.4	FR1
K RANGE	SSKRN003	SSKRN003_B	4616351.28	372042.4	05/27/2011	SW6010B	Zinc	16.2		MG/KG	0.029	0.98	FR1
K RANGE	SSKRN003	SSKRN003_B	4616351.28	372042.4	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.24	FR1
K RANGE	SSKRN003	SSKRN003_B	4616351.28	372042.4	05/27/2011	SW8330	Nitroglycerin	1810	J	UG/KG	593	1940	FR1
K RANGE	SSKRN003	SSKRN003_C	4616351.28	372042.4	05/27/2011	SW6010B	Lead	22.9		MG/KG	0.11	0.49	FR1
K RANGE	SSKRN003	SSKRN003_C	4616351.28	372042.4	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
K RANGE	SSKRN003	SSKRN003_C	4616351.28	372042.4	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.078	7.2	FR1
K RANGE	SSKRN003	SSKRN003_C	4616351.28	372042.4	05/27/2011	SW6010B	Zinc	16.2		MG/KG	0.029	0.98	FR1
K RANGE	SSKRN003	SSKRN003_C	4616351.28	372042.4	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.11	FR1
K RANGE	SSKRN003	SSKRN003_C	4616351.28	372042.4	05/27/2011	SW8330	Nitroglycerin	2180	J	UG/KG	605	1980	FR1

Table 4
K Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
K RANGE	SSKRRNG004	SSKRRNG004_A	4616355.92	372042.55	05/27/2011	SW6010B	Lead	25.3		MG/KG	0.11	0.49	N1
K RANGE	SSKRRNG004	SSKRRNG004_A	4616355.92	372042.55	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	N1
K RANGE	SSKRRNG004	SSKRRNG004_A	4616355.92	372042.55	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.078	6.8	N1
K RANGE	SSKRRNG004	SSKRRNG004_A	4616355.92	372042.55	05/27/2011	SW6010B	Zinc	17.0		MG/KG	0.029	0.88	N1
K RANGE	SSKRRNG004	SSKRRNG004_A	4616355.92	372042.55	05/27/2011	Tungsten		ND	U	MG/KG	0.011	0.11	N1
K RANGE	SSKRRNG004	SSKRRNG004_A	4616355.92	372042.55	05/27/2011	SW6330	Nitroglycerin	3280	J	UG/KG	801	1960	N1
K RANGE	SSKRRNG005	SSKRRNG005_A	4616362	372042.36	05/27/2011	SW6010B	Lead	27.6		MG/KG	0.11	0.50	N1
K RANGE	SSKRRNG005	SSKRRNG005_A	4616362	372042.36	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
K RANGE	SSKRRNG005	SSKRRNG005_A	4616362	372042.36	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.079	8.0	N1
K RANGE	SSKRRNG005	SSKRRNG005_A	4616362	372042.36	05/27/2011	SW6010B	Zinc	17.9		MG/KG	0.030	0.99	N1
K RANGE	SSKRRNG005	SSKRRNG005_A	4616362	372042.36	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.13	N1
K RANGE	SSKRRNG005	SSKRRNG005_A	4616362	372042.36	05/27/2011	SW6330	Nitroglycerin	5620		UG/KG	598	1960	N1
K RANGE	SSKRRNG005	SSKRRNG005_B	4616362	372042.36	05/27/2011	SW6010B	Lead	30.0		MG/KG	0.11	0.49	FR1
K RANGE	SSKRRNG005	SSKRRNG005_B	4616362	372042.36	05/27/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
K RANGE	SSKRRNG005	SSKRRNG005_B	4616362	372042.36	05/27/2011	SW6010B	Copper	ND	U	MG/KG	0.078	7.2	FR1
K RANGE	SSKRRNG005	SSKRRNG005_B	4616362	372042.36	05/27/2011	SW6010B	Zinc	17.7		MG/KG	0.029	0.98	FR1
K RANGE	SSKRRNG005	SSKRRNG005_B	4616362	372042.36	05/27/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.11	FR1
K RANGE	SSKRRNG005	SSKRRNG005_B	4616362	372042.36	05/27/2011	SW6330	Nitroglycerin	3400	J	UG/KG	614	2010	FR1
K RANGE	SSKRRNG005	SSKRRNG005_C	4616362	372042.36	05/31/2011	SW6010B	Lead	27.8		MG/KG	0.11	0.49	FR1
K RANGE	SSKRRNG005	SSKRRNG005_C	4616362	372042.36	05/31/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
K RANGE	SSKRRNG005	SSKRRNG005_C	4616362	372042.36	05/31/2011	SW6010B	Copper	ND	U	MG/KG	0.079	8.5	FR1
K RANGE	SSKRRNG005	SSKRRNG005_C	4616362	372042.36	05/31/2011	SW6010B	Zinc	18.1		MG/KG	0.030	0.99	FR1
K RANGE	SSKRRNG005	SSKRRNG005_C	4616362	372042.36	05/31/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.13	FR1
K RANGE	SSKRRNG005	SSKRRNG005_C	4616362	372042.36	05/31/2011	SW6330	Nitroglycerin	1520	J	UG/KG	588	1920	FR1
K RANGE	SSKRRNG006	SSKRRNG006_A	4616366.35	372042.95	05/31/2011	SW6010B	Lead	21.1		MG/KG	0.11	0.49	N1
K RANGE	SSKRRNG006	SSKRRNG006_A	4616366.35	372042.95	05/31/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
K RANGE	SSKRRNG006	SSKRRNG006_A	4616366.35	372042.95	05/31/2011	SW6010B	Copper	ND	U	MG/KG	0.079	7.9	N1
K RANGE	SSKRRNG006	SSKRRNG006_A	4616366.35	372042.95	05/31/2011	SW6010B	Zinc	32.8		MG/KG	0.030	0.99	N1
K RANGE	SSKRRNG006	SSKRRNG006_A	4616366.35	372042.95	05/31/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.21	N1

Notes:

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² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 5
K Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	LYKRRNG001	LYKRRNG001FA	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG001	LYKRRNG001FA	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Copper	2.1	J	UG/L	0.89	20.0
K RANGE	LYKRRNG001	LYKRRNG001FA	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.38	2.0
K RANGE	LYKRRNG001	LYKRRNG001FA	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Zinc	3.6	J	UG/L	0.86	20.0
K RANGE	LYKRRNG001	LYKRRNG001FD	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG001	LYKRRNG001FD	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Copper	2.7	J	UG/L	0.89	20.0
K RANGE	LYKRRNG001	LYKRRNG001FD	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.36	2.0
K RANGE	LYKRRNG001	LYKRRNG001FD	4616348.28	372042.38	05/26/2011	SW6020	FLDFLT	Zinc	6.7	J	UG/L	0.86	20.0
K RANGE	LYKRRNG001	LYKRRNG001UA	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG001	LYKRRNG001UA	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Copper	1.8	J	UG/L	0.89	20.0
K RANGE	LYKRRNG001	LYKRRNG001UA	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.36	2.0
K RANGE	LYKRRNG001	LYKRRNG001UA	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
K RANGE	LYKRRNG001	LYKRRNG001UA	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Zinc	4.5	J	UG/L	0.86	20.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.80	2.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Copper	1.8	J	UG/L	0.89	20.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.35	2.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW6020	TOTAL	Zinc	3.7	J	UG/L	0.86	20.0
K RANGE	LYKRRNG001	LYKRRNG001UD	4616348.28	372042.38	05/26/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
K RANGE	LYKRRNG002	LYKRRNG002FA	4616355.95	372042.03	05/26/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG002	LYKRRNG002FA	4616355.95	372042.03	05/26/2011	SW6020	FLDFLT	Copper	2.1	J	UG/L	0.89	20.0
K RANGE	LYKRRNG002	LYKRRNG002FA	4616355.95	372042.03	05/26/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.37	2.0
K RANGE	LYKRRNG002	LYKRRNG002FA	4616355.95	372042.03	05/26/2011	SW6020	FLDFLT	Zinc	3.5	J	UG/L	0.86	20.0
K RANGE	LYKRRNG002	LYKRRNG002UA	4616355.95	372042.03	05/26/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG002	LYKRRNG002UA	4616355.95	372042.03	05/26/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
K RANGE	LYKRRNG002	LYKRRNG002UA	4616355.95	372042.03	05/26/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.64	2.0
K RANGE	LYKRRNG002	LYKRRNG002UA	4616355.95	372042.03	05/26/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
K RANGE	LYKRRNG002	LYKRRNG002UA	4616355.95	372042.03	05/26/2011	SW6020	TOTAL	Zinc	1.6	J	UG/L	0.86	20.0
K RANGE	LYKRRNG002	LYKRRNG003FA	4616367.5	372076.56	05/26/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
K RANGE	LYKRRNG003	LYKRRNG003FA	4616367.5	372076.56	05/26/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG003	LYKRRNG003FA	4616367.5	372076.56	05/26/2011	SW6020	FLDFLT	Copper	1.2	J	UG/L	0.89	20.0
K RANGE	LYKRRNG003	LYKRRNG003FA	4616367.5	372076.56	05/26/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	1.6	2.0
K RANGE	LYKRRNG003	LYKRRNG003FA	4616367.5	372076.56	05/26/2011	SW6020	FLDFLT	Zinc	1.8	J	UG/L	0.86	20.0
K RANGE	LYKRRNG003	LYKRRNG003UA	4616367.5	372076.56	05/26/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG003	LYKRRNG003UA	4616367.5	372076.56	05/26/2011	SW6020	TOTAL	Copper	0.89	J	UG/L	0.89	20.0
K RANGE	LYKRRNG003	LYKRRNG003UA	4616367.5	372076.56	05/26/2011	SW6020	TOTAL	Lead	ND	U	UG/L	1.9	2.0
K RANGE	LYKRRNG003	LYKRRNG003UA	4616367.5	372076.56	05/26/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
K RANGE	LYKRRNG003	LYKRRNG003UA	4616367.5	372076.56	05/26/2011	SW6020	TOTAL	Zinc	3.8	J	UG/L	0.86	20.0
K RANGE	LYKRRNG003	LYKRRNG003UA	4616367.5	372076.56	05/26/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0

K Range

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Table 5
K Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	LYKRRNG004	LYKRRNG004FA	4616367.19	372011.16	05/26/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG004	LYKRRNG004FA	4616367.19	372011.16	05/26/2011	SW6020	FLDFLT	Copper	5.6	J	UG/L	0.89	20.0
K RANGE	LYKRRNG004	LYKRRNG004FA	4616367.19	372011.16	05/26/2011	SW6020	FLDFLT	Lead	2.5		UG/L	0.035	2.0
K RANGE	LYKRRNG004	LYKRRNG004FA	4616367.19	372011.16	05/26/2011	SW6020	FLDFLT	Zinc	3.6	J	UG/L	0.86	20.0
K RANGE	LYKRRNG004	LYKRRNG004UA	4616367.19	372011.16	05/26/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	LYKRRNG004	LYKRRNG004UA	4616367.19	372011.16	05/26/2011	SW6020	TOTAL	Copper	6.0	J	UG/L	0.89	20.0
K RANGE	LYKRRNG004	LYKRRNG004UA	4616367.19	372011.16	05/26/2011	SW6020	TOTAL	Lead	5.6		UG/L	0.035	2.0
K RANGE	LYKRRNG004	LYKRRNG004UA	4616367.19	372011.16	05/26/2011	SW6020	TOTAL	Tungsten	0.38	J	UG/L	0.30	2.0
K RANGE	LYKRRNG004	LYKRRNG004UA	4616367.19	372011.16	05/26/2011	SW6020	TOTAL	Zinc	4.5	J	UG/L	0.86	20.0
K RANGE	LYKRRNG004	LYKRRNG004UA	4616367.19	372011.16	05/26/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0

Notes:

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² MDL = Method Detection Limit

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K Range

Table 6
K Range Validated Groundwater Data

Site ID	Location ID	Field Sample ID	Top depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	MW-473S	MW-473S_MAY11FA	83.38	93.38	05/25/2011	SW6020	FLDFLT	Copper	8.3	J	UG/L	0.89	20.0
K RANGE	MW-473S	MW-473S_MAY11FA	83.38	93.38	05/25/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	MW-473S	MW-473S_MAY11FA	83.38	93.38	05/25/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.71	2.0
K RANGE	MW-473S	MW-473S_MAY11FA	83.38	93.38	05/25/2011	SW6020	FLDFLT	Zinc	7.0	J	UG/L	0.86	20.0
K RANGE	MW-473S	MW-473S_MAY11UA	83.38	93.38	05/25/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
K RANGE	MW-473S	MW-473S_MAY11UA	83.38	93.38	05/25/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	MW-473S	MW-473S_MAY11UA	83.38	93.38	05/25/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
K RANGE	MW-473S	MW-473S_MAY11UA	83.38	93.38	05/25/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.41	2.0
K RANGE	MW-473S	MW-473S_MAY11UA	83.38	93.38	05/25/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
K RANGE	MW-473S	MW-473S_MAY11UA	83.38	93.38	05/25/2011	SW6020	TOTAL	Zinc	2.8	J	UG/L	0.86	20.0
K RANGE	MW-474S	MW-474S_MAY11FA	86.44	96.44	05/25/2011	SW6020	FLDFLT	Copper	1.7	J	UG/L	0.89	20.0
K RANGE	MW-474S	MW-474S_MAY11FA	86.44	96.44	05/25/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	MW-474S	MW-474S_MAY11FA	86.44	96.44	05/25/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	1.2	2.0
K RANGE	MW-474S	MW-474S_MAY11FA	86.44	96.44	05/25/2011	SW6020	FLDFLT	Zinc	13.0	J	UG/L	0.86	20.0
K RANGE	MW-474S	MW-474S_MAY11UA	86.44	96.44	05/25/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
K RANGE	MW-474S	MW-474S_MAY11UA	86.44	96.44	05/25/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
K RANGE	MW-474S	MW-474S_MAY11UA	86.44	96.44	05/25/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
K RANGE	MW-474S	MW-474S_MAY11UA	86.44	96.44	05/25/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.84	2.0
K RANGE	MW-474S	MW-474S_MAY11UA	86.44	96.44	05/25/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
K RANGE	MW-474S	MW-474S_MAY11UA	86.44	96.44	05/25/2011	SW6020	TOTAL	Zinc	3.6	J	UG/L	0.86	20.0

Notes:

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² MDL = Method Detection Limit

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K Range

Table 7
T Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
T RANGE	SSTRNG1A	SSTRNG1A_A	4621047.58	373702.38	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
T RANGE	SSTRNG1A	SSTRNG1A_A	4621047.58	373702.38	05/23/2011	SW6010B	Copper	23.5		MG/KG	0.079	1.2	N1
T RANGE	SSTRNG1A	SSTRNG1A_A	4621047.58	373702.38	05/23/2011	SW6010B	Lead	21.6		MG/KG	0.11	0.49	N1
T RANGE	SSTRNG1A	SSTRNG1A_A	4621047.58	373702.38	05/23/2011	SW6010B	Zinc	30.7		MG/KG	0.030	0.99	N1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.15	N1
T RANGE	SSTRNG1A	SSTRNG1A_A	4621047.58	373702.38	05/23/2011	SW6330	Nitroglycerin	16800		UG/KG	618	2020	N1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6010B	Copper	56.7		MG/KG	0.078	1.2	FR1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6010B	Lead	20.9		MG/KG	0.11	0.49	FR1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6010B	Zinc	31.5		MG/KG	0.029	0.98	FR1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.11	FR1
T RANGE	SSTRNG1A	SSTRNG1A_B	4621047.58	373702.38	05/23/2011	SW6330	Nitroglycerin	12000	J	UG/KG	596	1950	FR1
T RANGE	SSTRNG1A	SSTRNG1A_C	4621047.58	373702.38	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNG1A	SSTRNG1A_C	4621047.58	373702.38	05/23/2011	SW6010B	Copper	22.9		MG/KG	0.079	1.2	FR1
T RANGE	SSTRNG1A	SSTRNG1A_C	4621047.58	373702.38	05/23/2011	SW6010B	Lead	23.7		MG/KG	0.11	0.49	FR1
T RANGE	SSTRNG1A	SSTRNG1A_C	4621047.58	373702.38	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.030	0.99	FR1
T RANGE	SSTRNG1A	SSTRNG1A_C	4621047.58	373702.38	05/23/2011	SW6330	Nitroglycerin	17500		UG/KG	614	2010	FR1
T RANGE	SSTRNG1A	SSTRNG1B_A	4621044.14	373699.09	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
T RANGE	SSTRNG1A	SSTRNG1B_A	4621044.14	373699.09	05/23/2011	SW6010B	Copper	10.2		MG/KG	0.080	1.2	N1
T RANGE	SSTRNG1A	SSTRNG1B_A	4621044.14	373699.09	05/23/2011	SW6010B	Lead	17.9		MG/KG	0.11	0.50	N1
T RANGE	SSTRNG1A	SSTRNG1B_A	4621044.14	373699.09	05/23/2011	SW6020	Zinc	23.5		MG/KG	0.030	1.0	N1
T RANGE	SSTRNG1A	SSTRNG1B_A	4621044.14	373699.09	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.012	0.12	N1
T RANGE	SSTRNG1A	SSTRNG1B_A	4621044.14	373699.09	05/23/2011	SW6330	Nitroglycerin	3960	J	UG/KG	601	1960	N1
T RANGE	SSTRNG1A	SSTRNG1B_B	4621044.14	373699.09	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNG1A	SSTRNG1B_B	4621044.14	373699.09	05/23/2011	SW6010B	Copper	16.4		MG/KG	0.079	1.2	FR1
T RANGE	SSTRNG1A	SSTRNG1B_B	4621044.14	373699.09	05/23/2011	SW6010B	Lead	25.5		MG/KG	0.11	0.49	FR1
T RANGE	SSTRNG1A	SSTRNG1B_B	4621044.14	373699.09	05/23/2011	SW6010B	Zinc	34.7		MG/KG	0.030	0.99	FR1
T RANGE	SSTRNG1A	SSTRNG1B_B	4621044.14	373699.09	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.19	FR1
T RANGE	SSTRNG1A	SSTRNG1B_B	4621044.14	373699.09	05/23/2011	SW6330	Nitroglycerin	2170	J	UG/KG	599	1960	FR1
T RANGE	SSTRNG1A	SSTRNG1B_C	4621044.14	373699.09	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNG1A	SSTRNG1B_C	4621044.14	373699.09	05/23/2011	SW6010B	Copper	14.2		MG/KG	0.079	1.2	FR1
T RANGE	SSTRNG1A	SSTRNG1B_C	4621044.14	373699.09	05/23/2011	SW6010B	Lead	23.7		MG/KG	0.11	0.49	FR1
T RANGE	SSTRNG1A	SSTRNG1B_C	4621044.14	373699.09	05/23/2011	SW6020	Zinc	25.1		MG/KG	0.030	0.99	FR1
T RANGE	SSTRNG1A	SSTRNG1B_C	4621044.14	373699.09	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.011	0.17	FR1
T RANGE	SSTRNG1A	SSTRNG1B_C	4621044.14	373699.09	05/23/2011	SW6330	Nitroglycerin	3560	J	UG/KG	614	2010	FR1
T RANGE	SSTRNG1A	SSTRNG1C_A	4621040.45	373695.76	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
T RANGE	SSTRNG1A	SSTRNG1C_A	4621040.45	373695.76	05/23/2011	SW6010B	Copper	136		MG/KG	0.080	1.2	N1
T RANGE	SSTRNG1A	SSTRNG1C_A	4621040.45	373695.76	05/23/2011	SW6010B	Lead	357		MG/KG	0.11	0.50	N1
T RANGE	SSTRNG1A	SSTRNG1C_A	4621040.45	373695.76	05/23/2011	SW6010B	Zinc	41.3		MG/KG	0.030	1.0	N1
T RANGE	SSTRNG1A	SSTRNG1C_A	4621040.45	373695.76	05/23/2011	SW6020	Tungsten	2.0		MG/KG	0.011	0.10	N1
T RANGE	SSTRNG1A	SSTRNG1C_A	4621040.45	373695.76	05/23/2011	SW6330	Nitroglycerin	7400	J	UG/KG	616	2010	N1

T Range

Table 7
T Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
T RANGE	SSTRNGA1C	SSTRNG1C_B	4621040.45	373695.76	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_B	4621040.45	373695.76	05/23/2011	SW6010B	Copper	86.5		MG/KG	0.078	1.2	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_B	4621040.45	373695.76	05/23/2011	SW6010B	Lead	293		MG/KG	0.11	0.49	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_B	4621040.45	373695.76	05/23/2011	SW6010B	Zinc	35.8		MG/KG	0.029	0.98	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_B	4621040.45	373695.76	05/23/2011	SW6020	Tungsten	1.2		MG/KG	0.011	0.098	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_B	4621040.45	373695.76	05/23/2011	SW6330	Nitroglycerin	3640	J	UG/KG	608	1890	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_C	4621040.45	373695.76	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_C	4621040.45	373695.76	05/23/2011	SW6010B	Copper	124		MG/KG	0.079	1.2	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_C	4621040.45	373695.76	05/23/2011	SW6010B	Lead	293		MG/KG	0.11	0.50	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_C	4621040.45	373695.76	05/23/2011	SW6010B	Zinc	34.7		MG/KG	0.030	0.99	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_C	4621040.45	373695.76	05/23/2011	SW6020	Tungsten	2.5		MG/KG	0.011	0.099	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_C	4621040.45	373695.76	05/23/2011	SW6330	Nitroglycerin	6210	J	UG/KG	616	2010	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_A	4621036.81	373692.3	05/23/2011	SW6010B	Antimony	17.9		MG/KG	0.19	3.0	N1
T RANGE	SSTRNGA1D	SSTRNG1D_A	4621036.81	373692.3	05/23/2011	SW6010B	Copper	276		MG/KG	0.080	1.2	N1
T RANGE	SSTRNGA1D	SSTRNG1D_A	4621036.81	373692.3	05/23/2011	SW6010B	Lead	522		MG/KG	0.11	0.50	N1
T RANGE	SSTRNGA1D	SSTRNG1D_A	4621036.81	373692.3	05/23/2011	SW6010B	Zinc	48.4		MG/KG	0.030	1.0	N1
T RANGE	SSTRNGA1D	SSTRNG1D_A	4621036.81	373692.3	05/23/2011	SW6020	Tungsten	10.6		MG/KG	0.012	0.10	N1
T RANGE	SSTRNGA1D	SSTRNG1D_A	4621036.81	373692.3	05/23/2011	SW6330	Nitroglycerin	8600		UG/KG	613	2000	N1
T RANGE	SSTRNGA1D	SSTRNG1D_B	4621036.81	373692.3	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_B	4621036.81	373692.3	05/23/2011	SW6010B	Copper	197		MG/KG	0.080	1.2	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_B	4621036.81	373692.3	05/23/2011	SW6010B	Lead	135		MG/KG	0.11	0.50	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_B	4621036.81	373692.3	05/23/2011	SW6020	Tungsten	28.9		MG/KG	0.030	1.0	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_B	4621036.81	373692.3	05/23/2011	SW6330	Nitroglycerin	8940		UG/KG	592	1930	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_C	4621036.81	373692.3	05/23/2011	SW6010B	Antimony	1.8	J	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_C	4621036.81	373692.3	05/23/2011	SW6010B	Copper	265		MG/KG	0.080	1.3	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_C	4621036.81	373692.3	05/23/2011	SW6010B	Lead	357		MG/KG	0.11	0.50	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_C	4621036.81	373692.3	05/23/2011	SW6010B	Zinc	34.6		MG/KG	0.030	1.0	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_C	4621036.81	373692.3	05/23/2011	SW6020	Tungsten	13.7		MG/KG	0.012	0.10	FR1
T RANGE	SSTRNGA1D	SSTRNG1E_A	4621032.9	373692.3	05/23/2011	SW6330	Nitroglycerin	15000		UG/KG	616	2010	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_A	4621032.9	373698.03	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
T RANGE	SSTRNGA1E	SSTRNG1E_A	4621032.9	373698.03	05/23/2011	SW6010B	Copper	58.5		MG/KG	0.079	1.2	N1
T RANGE	SSTRNGA1E	SSTRNG1E_A	4621032.9	373698.03	05/23/2011	SW6010B	Lead	172		MG/KG	0.11	0.50	N1
T RANGE	SSTRNGA1E	SSTRNG1E_A	4621032.9	373698.03	05/23/2011	SW6010B	Zinc	21.4		MG/KG	0.030	0.99	N1
T RANGE	SSTRNGA1E	SSTRNG1E_A	4621032.9	373698.03	05/23/2011	SW6020	Tungsten	2.7		MG/KG	0.011	0.099	N1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6330	Nitroglycerin	18700		UG/KG	602	1970	N1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	2.9	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6010B	Copper	51.2		MG/KG	0.078	1.2	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6010B	Lead	209		MG/KG	0.11	0.49	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6010B	Zinc	29.5		MG/KG	0.029	0.98	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6020	Tungsten	2.0		MG/KG	0.011	0.098	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_B	4621032.9	373698.03	05/23/2011	SW6330	Nitroglycerin	13300		UG/KG	616	2010	FR1

T Range

Table 7
T Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
T RANGE	SSTRNGA1E	SSTRNG1E_C	4621032.9	373689.03	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_C	4621032.9	373689.03	05/23/2011	SW6010B	Copper	131		MG/KG	0.079	1.2	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_C	4621032.9	373689.03	05/23/2011	SW6010B	Lead	135		MG/KG	0.11	0.50	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_C	4621032.9	373689.03	05/23/2011	SW6010B	Zinc	47.1		MG/KG	0.030	0.99	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_C	4621032.9	373689.03	05/23/2011	SW6020	Tungsten	2.5		MG/KG	0.011	0.099	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_C	4621032.9	373689.03	05/23/2011	SW6330	Nitroglycerin	16900		UG/KG	603	1970	FR1
T RANGE	SSTRNGA2A	SSTRNG2A_A	4621029.53	373685.65	05/23/2011	SW6010B	Antimony	ND	U	MG/KG	0.19	3.0	N1
T RANGE	SSTRNGA2A	SSTRNG2A_A	4621029.53	373685.65	05/23/2011	SW6010B	Copper	8.9		MG/KG	0.080	1.2	N1
T RANGE	SSTRNGA2A	SSTRNG2A_A	4621029.53	373685.65	05/23/2011	SW6010B	Lead	10.3		MG/KG	0.11	0.50	N1
T RANGE	SSTRNGA2A	SSTRNG2A_A	4621029.53	373685.65	05/23/2011	SW6010B	Zinc	23.9		MG/KG	0.030	1.0	N1
T RANGE	SSTRNGA2A	SSTRNG2A_A	4621029.53	373685.65	05/23/2011	SW6020	Tungsten	ND	U	MG/KG	0.012	0.19	N1

Notes:

¹ Qualifiers: U = Non-detect. J = Value is estimated less than the reporting limit or due to limitation identified in the data validation. UU = The analyte was not detected above this value and is estimated due to limitation in the data validation.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 8
T Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
T RANGE	LYTRNG011	LYTR011FA	4621043.62	373700.93	05/24/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	LYTRNG011	LYTR011FA	4621043.62	373700.93	05/24/2011	SW6020	FLDFLT	Copper	2.2	J	UG/L	0.89	20.0
T RANGE	LYTRNG011	LYTR011FA	4621043.62	373700.93	05/24/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.90	2.0
T RANGE	LYTRNG011	LYTR011FA	4621043.62	373700.93	05/24/2011	SW6020	FLDFLT	Zinc	2.9	J	UG/L	0.86	20.0
T RANGE	LYTRNG011	LYTR011UA	4621043.62	373700.93	05/24/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	LYTRNG011	LYTR011UA	4621043.62	373700.93	05/24/2011	SW6020	TOTAL	Copper	2.1	J	UG/L	0.89	20.0
T RANGE	LYTRNG011	LYTR011UA	4621043.62	373700.93	05/24/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.91	2.0
T RANGE	LYTRNG011	LYTR011UA	4621043.62	373700.93	05/24/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
T RANGE	LYTRNG011	LYTR011UA	4621043.62	373700.93	05/24/2011	SW6020	TOTAL	Zinc	5.8	J	UG/L	0.86	20.0
T RANGE	LYTRNG011	LYTR011UA	4621043.62	373700.93	05/24/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.80	2.0
T RANGE	LYTRNG012	LYTR012FA	4621035.71	373692.76	05/24/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	LYTRNG012	LYTR012FA	4621035.71	373692.76	05/24/2011	SW6020	FLDFLT	Copper	1.4	J	UG/L	0.89	20.0
T RANGE	LYTRNG012	LYTR012FA	4621035.71	373692.76	05/24/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.35	2.0
T RANGE	LYTRNG012	LYTR012FA	4621035.71	373692.76	05/24/2011	SW6020	FLDFLT	Zinc	4.6	J	UG/L	0.86	20.0
T RANGE	LYTRNG012	LYTR012UA	4621035.71	373692.76	05/24/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	LYTRNG012	LYTR012UA	4621035.71	373692.76	05/24/2011	SW6020	TOTAL	Copper	1.3	J	UG/L	0.89	20.0
T RANGE	LYTRNG012	LYTR012UA	4621035.71	373692.76	05/24/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.36	2.0
T RANGE	LYTRNG012	LYTR012UA	4621035.71	373692.76	05/24/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
T RANGE	LYTRNG012	LYTR012UA	4621035.71	373692.76	05/24/2011	SW6020	TOTAL	Zinc	3.8	J	UG/L	0.86	20.0
T RANGE	LYTRNG012	LYTR012UA	4621035.71	373692.76	05/24/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
T RANGE	LYTRNG013	LYTR013FA	4621028.28	373684.12	05/24/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	LYTRNG013	LYTR013FA	4621028.28	373684.12	05/24/2011	SW6020	FLDFLT	Copper	8.5	J	UG/L	0.89	20.0
T RANGE	LYTRNG013	LYTR013FA	4621028.28	373684.12	05/24/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.26	2.0
T RANGE	LYTRNG013	LYTR013FA	4621028.28	373684.12	05/24/2011	SW6020	FLDFLT	Zinc	14.9	J	UG/L	0.86	20.0
T RANGE	LYTRNG013	LYTR013UA	4621028.28	373684.12	05/24/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	LYTRNG013	LYTR013UA	4621028.28	373684.12	05/24/2011	SW6020	TOTAL	Copper	1.4	J	UG/L	0.89	20.0
T RANGE	LYTRNG013	LYTR013UA	4621028.28	373684.12	05/24/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.26	2.0
T RANGE	LYTRNG013	LYTR013UA	4621028.28	373684.12	05/24/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
T RANGE	LYTRNG013	LYTR013UA	4621028.28	373684.12	05/24/2011	SW6020	TOTAL	Zinc	14.1	J	UG/L	0.86	20.0
T RANGE	LYTRNG013	LYTR013UA	4621028.28	373684.12	05/24/2011	SW8330	METHOD	Nitroglycerin	ND	UU	UG/L	0.60	2.0

Notes:

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² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 9
T Range Validated Groundwater Data

Site ID	Location ID	Field Sample ID	Top depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
T RANGE	MW-467S	MW-467S_MAY11FA	124.94	134.94	05/24/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	MW-467S	MW-467S_MAY11FA	124.94	134.94	05/24/2011	SW6020	FLDFLT	Copper	ND	U	UG/L	0.89	20.0
T RANGE	MW-467S	MW-467S_MAY11FA	124.94	134.94	05/24/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.23	20.0
T RANGE	MW-467S	MW-467S_MAY11FA	124.94	134.94	05/24/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.86	20.0
T RANGE	MW-467S	MW-467S_MAY11UA	124.94	134.94	05/24/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
T RANGE	MW-467S	MW-467S_MAY11UA	124.94	134.94	05/24/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	MW-467S	MW-467S_MAY11UA	124.94	134.94	05/24/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.89	20.0
T RANGE	MW-467S	MW-467S_MAY11UA	124.94	134.94	05/24/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.41	2.0
T RANGE	MW-467S	MW-467S_MAY11UA	124.94	134.94	05/24/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
T RANGE	MW-467S	MW-467S_MAY11UA	124.94	134.94	05/24/2011	SW6020	TOTAL	Zinc	6.0	J	UG/L	0.86	20.0
T RANGE	MW-489S	MW-489S_MAY11FA	124.58	134.58	05/24/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	MW-489S	MW-489S_MAY11FA	124.58	134.58	05/24/2011	SW6020	FLDFLT	Copper	ND	U	UG/L	0.89	20.0
T RANGE	MW-489S	MW-489S_MAY11FA	124.58	134.58	05/24/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.24	2.0
T RANGE	MW-489S	MW-489S_MAY11FA	124.58	134.58	05/24/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.86	20.0
T RANGE	MW-489S	MW-489S_MAY11UA	124.58	134.58	05/24/2011	SW6020	TOTAL	Copper	3.6	J	UG/L	0.89	20.0
T RANGE	MW-489S	MW-489S_MAY11UA	124.58	134.58	05/24/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.60	2.0
T RANGE	MW-489S	MW-489S_MAY11UA	124.58	134.58	05/24/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	1.6	20.0
T RANGE	MW-489S	MW-489S_MAY11UA	124.58	134.58	05/24/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.42	2.0
T RANGE	MW-489S	MW-489S_MAY11UA	124.58	134.58	05/24/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.30	2.0
T RANGE	MW-489S	MW-489S_MAY11UA	124.58	134.58	05/24/2011	SW6020	TOTAL	Zinc	3.0	J	UG/L	0.86	20.0

Notes:

¹ Qualifiers: U = Non-detect. J = Value is estimated less than the reporting limit or due to limitation identified in the data validation. UU = The analyte was not detected above this value and is estimated due to limitation in the data validation.

² MDL = Method Detection Limit

³ RL = Reporting Limit

T Range

Table 10
J and K Ranges Validated STAPP Data

Site ID	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Aluminum	132	J	UG/L	39.0	200
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6020	TOTAL	Antimony	61.5		UG/L	1.6	20.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Barium	54.9	J	UG/L	5.2	200
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Boron	42.7	J	UG/L	1.7	100
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6020	TOTAL	Cadmium	0.36	J	UG/L	0.070	2.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Calcium	30300		UG/L	120	5000
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Iron	1130		UG/L	39.0	200
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Lead	12.3		UG/L	5.4	10.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Magnesium	11800		UG/L	64.0	5000
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Manganese	59.8		UG/L	1.9	15.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW7470A	TOTAL	Mercury	ND	U	UG/L	0.066	0.20
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6020	TOTAL	Arsenic	ND	U	UG/L	0.037	2.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6020	TOTAL	Beryllium	ND	U	UG/L	0.053	2.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6020	TOTAL	Thallium	ND	U	UG/L	0.049	2.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Chromium, Total	ND	U	UG/L	0.55	10.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Cobalt	ND	U	UG/L	0.92	50.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Copper	ND	U	UG/L	1.6	25.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Molybdenum	ND	U	UG/L	1.5	10.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Silver	ND	U	UG/L	2.1	10.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Vanadium	ND	U	UG/L	1.6	50.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Nickel	5.9	J	UG/L	1.8	40.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Potassium	1800	J	UG/L	180	5000
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Selenium	7.0	J	UG/L	6.1	35.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Sodium	3390	J	UG/L	51.0	5000
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6020	TOTAL	Tungsten	0.50	J	UG/L	0.30	2.0
J RANGE	WLJ RNG	WSJRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Zinc	11500		UG/L	0.75	20.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Aluminum	41.0	J	UG/L	39.0	200
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6020	TOTAL	Antimony	173		UG/L	1.6	20.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Barium	138	J	UG/L	5.2	200
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Boron	125		UG/L	1.7	100
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6020	TOTAL	Cadmium	0.68	J	UG/L	0.070	2.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Calcium	54300		UG/L	120	5000
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Iron	2680		UG/L	39.0	200
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Lead	14.2		UG/L	5.4	10.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Magnesium	18400		UG/L	64.0	5000
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Manganese	42.3		UG/L	1.9	15.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW7470A	TOTAL	Mercury	ND	U	UG/L	0.066	0.20
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6020	TOTAL	Arsenic	ND	U	UG/L	0.037	2.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6020	TOTAL	Beryllium	ND	U	UG/L	0.053	2.0
K RANGE	WLK RNG	WSKRSTAPP_0411	04/15/2011	SW6020	TOTAL	Thallium	ND	U	UG/L	0.049	2.0

J and K Range

Page 1 of 2

Table 10
J abd K Ranges Validated STAPP Data

Site ID	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Chromium, Total	ND	U	UG/L	0.55	10.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Cobalt	ND	U	UG/L	0.92	50.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Copper	ND	U	UG/L	1.6	25.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Molybdenum	ND	U	UG/L	1.5	10.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Selenium	ND	U	UG/L	6.1	35.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Silver	ND	U	UG/L	2.1	10.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Vanadium	ND	U	UG/L	1.6	50.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Nickel	12.6	J	UG/L	1.8	40.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Potassium	1760	J	UG/L	180	5000
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Sodium	4750	J	UG/L	51.0	5000
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6020	TOTAL	Tungsten	0.37	J	UG/L	0.30	2.0
K RANGE	WLKRNG	WSKRSTAPP_0411	04/15/2011	SW6010B	TOTAL	Zinc	10400		UG/L	0.75	20.0

Notes:

¹ Qualifiers: U = Non-detect. J = Value is estimated less than the reporting limit or due to limitation identified in the data validation. UJ = The analyte was not detected above this value and is estimated due to limitation in the data validation.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Attachment 2

**J, K, and T Ranges Sampling and Analysis
Data Report
By TetraTech
December 2011**

Draft
J, K and T Ranges Sampling and Analysis
Data Report

Massachusetts Military Reservation
Cape Cod, Massachusetts

December 2011

Prepared for:

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts
for
Massachusetts Army National Guard
Camp Edwards, Massachusetts

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December 2011

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APPENDIX

Appendix A Data Tables

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- Table 3 J Range Validated Groundwater Data
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1.0 FIELD ACTIVITIES SUMMARY

Field activities for the Fall 2011 Sampling Event were initiated on October 5, 2011 in accordance with the *Statement of Work: Range Control Small Arms Ranges Sampling* (dated August 23, 2011). The statement of work summarizes the approved modifications to the Operations Maintenance and Monitoring/Best Management Practices Plans for the Juliet Range, Kilo Range and Tango Ranges. All samples were submitted to Test America Laboratory, Inc. in Burlington, Vermont for analysis. Results from the October 2011 sampling events are presented in data tables organized by Range and matrix in Appendix A.

1.1 Juliet Range

Soil samples were collected using the incremental sampling method from six equal-sized grids (Areas 1 through 6) 5-meters wide and the full length of the firing line extending along the range floor from the firing line to the berm as shown in Figure 1.

One hundred point composite samples were collected from depth of 0 to 3 inches below ground surface (bgs) on October 13, 2011. Two replicate 100-point samples were also collected from Areas 1, 3 and 5. All samples were ground and processed in accordance with Method 8330B. Samples collected from Areas 1 through 5 were submitted for lead, copper, antimony, zinc and tungsten analyses via Method 3050B/6020 and nitroglycerin analysis via Method 8330B. The sample collected from Area 6 was submitted for lead, copper, antimony, zinc and tungsten analyses via Method 3050B/6020.

Vadose zone water samples were collected from three pan lysimeters (LYJRNG01, LYJRNG02 and LYJRNG03) on October 11 and 12, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Figure 1 shows locations of the pan lysimeters.

Groundwater samples were collected from two monitoring wells MW-471S and MW-472S on October 5 and 6, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Groundwater sample locations are shown on Figure 1.

A sample was collected from the water accumulated in the STAPP system on October 13, 2011 and an unfiltered sample was submitted for TAL metals analysis by Method 3050B/6010B/6020 and tungsten analysis by Method 6020.

1.2 Kilo Range

Soil samples were collected using the incremental sampling method from six equal-sized grids (Areas 1 through 6) 5-meters wide and the full length of the firing line extending along the range floor from the firing line to the berm as shown in Figure 2.

One hundred point composite samples were collected from depth of 0 to 3 inches below ground surface (bgs) on October 14, 18 and 20, 2011. Two replicate 100-point samples were also collected from Areas 1, 3 and 5. All samples were ground and processed in accordance with Method 8330B. Samples collected from Areas 1 through 5 were submitted for lead, copper, antimony, zinc and tungsten analyses via Method 3050B/6020 and nitroglycerin analysis via Method 8330B. The sample collected from Area 6 was submitted for lead, copper, antimony, zinc and tungsten analyses via Method 3050B/6020.

Vadose zone water samples were collected from four pan lysimeters (LYKRNG001, LYKRNG002, LYKRNG003 and LYKRNG004) on October 12, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Field duplicate samples were collected and submitted from LYKRNG004. There was insufficient volume of water for all analyses in the lysimeter located at LYKRNG001 during sample collection on October 12, 2011. A sample was collected on October 21, 2011 and an unfiltered sample was submitted for nitroglycerin analysis. Metals were analyzed from the pore water samples collected October 12, 2011. Figure 2 shows locations of the pan lysimeters.

Groundwater samples were collected from two monitoring wells MW-473S and MW-474S on October 5, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Groundwater sample locations are shown on Figure 2.

A sample was collected from the water accumulated in the STAPP system on October 12, 2011 and an unfiltered sample was submitted for TAL metals analysis by Method 3050B/6010B/6020 and tungsten analysis by Method 6020.

1.3 Tango Range

Soil samples were collected using the incremental sampling method from six equal-sized grids (Areas 1A through 1E and Area 2A) 5-meters wide and the full length of the firing line extending along the range floor from the firing line to the berm as shown in Figure 3.

One hundred point composite samples were collected from depth of 0 to 3 inches below ground surface (bgs) on October 20 and 21, 2011. Two replicate 100-point samples were also collected from each of the range floor areas (Areas 1A through 1E). All samples were ground and processed in accordance with Method 8330B. Samples collected from Areas 1A through 1E were submitted for lead, copper, zinc, antimony and tungsten analyses via Method 3050B/6020 and nitroglycerin analysis via Method 8330B. The sample collected from Area 2A was submitted for lead, copper, zinc, antimony and tungsten analyses via Method 3050B/6020.

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Vadose zone water samples were collected from three pan lysimeters (LYTRNG011, LYTRNG012, and LYTRNG013) on October 11, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Figure 3 shows locations of the pan lysimeters.

Groundwater samples were collected from two monitoring wells MW-467S and MW-489S on October 10 and 11, 2011. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. Unfiltered (TOTAL) samples were submitted for lead, copper, antimony, zinc and tungsten analysis via Method 3050B/6020 and nitroglycerin via Method 8330B. Filtered (FLDFLT) samples were submitted for lead, copper, antimony and zinc analysis via Method 3050B/6020. Groundwater sample locations are shown on Figure 3.

A sample was collected from the water accumulated in the STAPP system on October 12, 2011 and an unfiltered sample was submitted for TAL metals analysis by Method 3050B/6010B/6020 and tungsten analysis by Method 6020.

2.0 SUMMARY

All samples have been collected in accordance with the August 2011 SOW and the data has been reviewed and validated in accordance with standard procedures. Sample results have been compared to Level 1 Interim Action Levels for antimony, lead, copper and nitroglycerin in soil, pore water and groundwater samples. Analytical data tables are presented by Range and matrix in Appendix A.

The lead and antimony results from the multi-point composite soil samples collected from all ranges were less than the action levels of 4,545 mg/kg and 1,750 mg/kg, respectively. The results for nitroglycerin in the MIS samples collected from the Area 1 at the J and K Ranges and Areas 1A, 1C, 1D and 1E at the T Range exceeded the action level of 5,000 µg/kg. The soil sample results for each range are presented in Tables 1, 4 and 7.

The lead, antimony and copper results from the lysimeter samples collected from all ranges were less than the action levels of 10 µg/L, 4.0 µg/L and 867 µg/L, respectively. The action level for nitroglycerin in pore water was 3.2 µg/L.

As noted above, the lysimeter samples that were submitted were pore water that had accumulated in the lysimeter since the last sampling event in May 2011. The matrix of these samples presented major interferences in the analysis for nitroglycerin. The analytical results were thoroughly reviewed and the majority of the samples were non-detect at levels below the action level of 3.2 ug/L. However, there were three samples where it was necessary to report nitroglycerin as non-detect with elevated reporting limits above the action level. The results for these samples [LYKRNG004 (samples and FD) and LYKRNG003] were reported as non-detect (ND) with elevated reporting limits. Considering the location of these lysimeters in the K Range near the berm and the STAPP system; it is unlikely that nitroglycerin is present in these

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samples. However, the matrices of these samples had too much interference to confidently determine nitroglycerin to be non-detect at the reporting limit of 2 ug/L. The lysimeter sample results are presented in Tables 2, 5 and 8.

The lead, antimony and copper results from the groundwater samples collected from all ranges were less than the action levels of 5.0 µg/L, 2.0 µg/L and 434 µg/L, respectively. The action level for nitroglycerin in groundwater was 1.6 µg/L; the results for nitroglycerin in the groundwater samples from all ranges were non-detect at 2 µg/L with a method detection limit of 0.6 µg/L. The groundwater sample results are presented in Tables 3, 6 and 9.

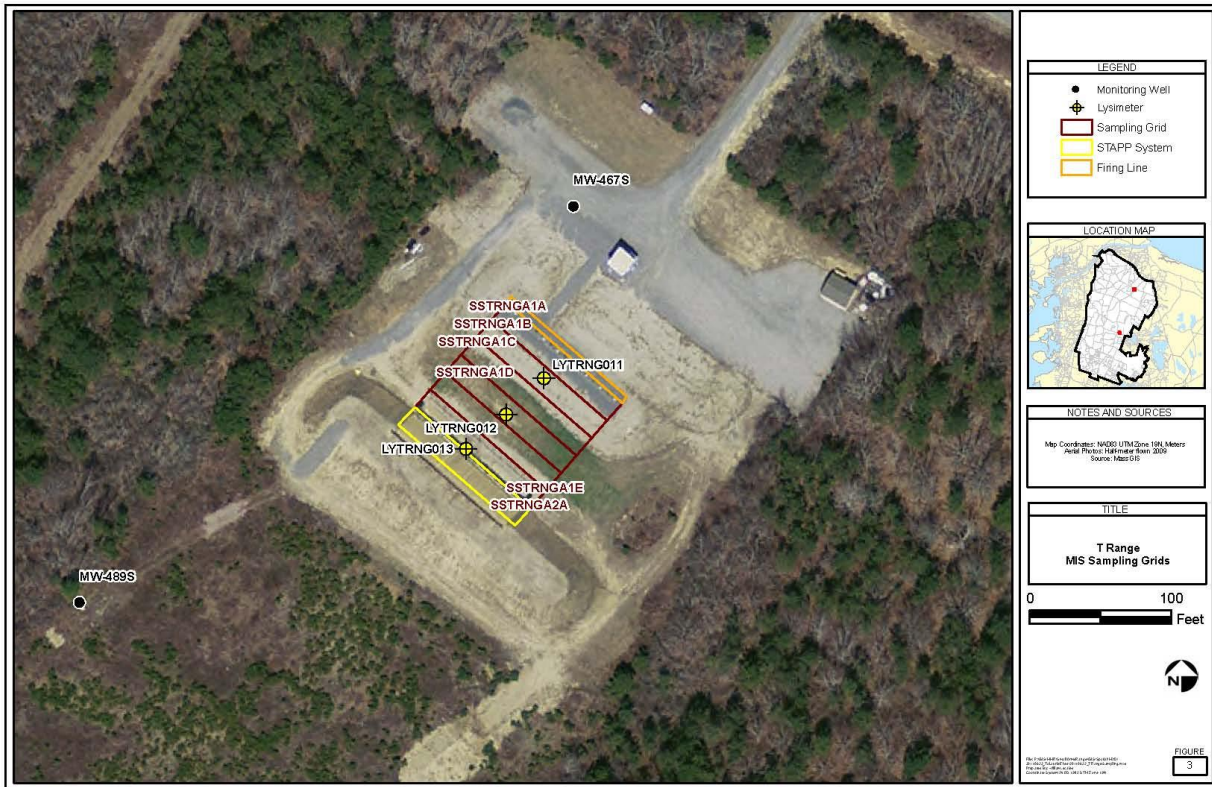
The STAPP sample results are presented in Table 10.

The data are usable for project related decisions.

FIGURES







APPENDIX A
Data Tables

Table 1
J Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
J RANGE	SSJRN001	SSJRN001_OCT11A	4616341.33	371958.87	10/13/2011	SW6020	Copper	20.3		MG/KG	0.0089	1.1	N1
J RANGE	SSJRN001	SSJRN001_OCT11A	4616341.33	371958.87	10/13/2011	SW6020	Lead	24.0		MG/KG	0.027	1.1	N1
J RANGE	SSJRN001	SSJRN001_OCT11A	4616341.33	371958.87	10/13/2011	SW6020	Zinc	39.1		MG/KG	0.61	11.2	N1
J RANGE	SSJRN001	SSJRN001_OCT11A	4616341.33	371958.87	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0046	1.1	N1
J RANGE	SSJRN001	SSJRN001_OCT11A	4616341.33	371958.87	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.028	0.22	N1
J RANGE	SSJRN001	SSJRN001_OCT11A	4616341.33	371958.87	10/13/2011	SW6020	Nitroglycerin	9980	J	UG/KG	611	2000	N1
J RANGE	SSJRN001	SSJRN001_OCT11B	4616341.33	371958.87	10/13/2011	SW6020	Copper	19.7		MG/KG	0.010	1.3	FR1
J RANGE	SSJRN001	SSJRN001_OCT11B	4616341.33	371958.87	10/13/2011	SW6020	Lead	21.3		MG/KG	0.031	1.3	FR1
J RANGE	SSJRN001	SSJRN001_OCT11B	4616341.33	371958.87	10/13/2011	SW6020	Zinc	37.3		MG/KG	0.71	13.0	FR1
J RANGE	SSJRN001	SSJRN001_OCT11B	4616341.33	371958.87	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0053	1.3	FR1
J RANGE	SSJRN001	SSJRN001_OCT11B	4616341.33	371958.87	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.032	0.26	FR1
J RANGE	SSJRN001	SSJRN001_OCT11B	4616341.33	371958.87	10/13/2011	SW6020	Nitroglycerin	11900		UG/KG	591	1930	FR1
J RANGE	SSJRN001	SSJRN001_OCT11C	4616341.33	371958.87	10/13/2011	SW6020	Lead	16.0		MG/KG	0.026	1.1	FR1
J RANGE	SSJRN001	SSJRN001_OCT11C	4616341.33	371958.87	10/13/2011	SW6020	Copper	21.3		MG/KG	0.0087	1.1	FR1
J RANGE	SSJRN001	SSJRN001_OCT11C	4616341.33	371958.87	10/13/2011	SW6020	Zinc	40.8		MG/KG	0.60	10.9	FR1
J RANGE	SSJRN001	SSJRN001_OCT11C	4616341.33	371958.87	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0045	1.1	FR1
J RANGE	SSJRN001	SSJRN001_OCT11C	4616341.33	371958.87	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.014	0.15	FR1
J RANGE	SSJRN001	SSJRN001_OCT11C	4616341.33	371958.87	10/13/2011	SW6020	Nitroglycerin	10400		UG/KG	607	1980	FR1
J RANGE	SSJRN002	SSJRN002_OCT11A	4616345.37	371959.24	10/13/2011	SW6020	Zinc	22.2		MG/KG	0.057	1.0	N1
J RANGE	SSJRN002	SSJRN002_OCT11A	4616345.37	371959.24	10/13/2011	SW6020	Lead	62.3		MG/KG	0.025	1.0	N1
J RANGE	SSJRN002	SSJRN002_OCT11A	4616345.37	371959.24	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0042	1.0	N1
J RANGE	SSJRN002	SSJRN002_OCT11A	4616345.37	371959.24	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.0083	9.2	N1
J RANGE	SSJRN002	SSJRN002_OCT11A	4616345.37	371959.24	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.11	N1
J RANGE	SSJRN002	SSJRN002_OCT11A	4616345.37	371959.24	10/13/2011	SW6020	Nitroglycerin	2090	J	UG/KG	585	1910	N1
J RANGE	SSJRN003	SSJRN003_OCT11A	4616350.92	371959.2	10/13/2011	SW6020	Lead	106		MG/KG	0.16	6.8	N1
J RANGE	SSJRN003	SSJRN003_OCT11A	4616350.92	371959.2	10/13/2011	SW6020	Zinc	18.6		MG/KG	0.074	1.4	N1
J RANGE	SSJRN003	SSJRN003_OCT11A	4616350.92	371959.2	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0055	1.4	N1
J RANGE	SSJRN003	SSJRN003_OCT11A	4616350.92	371959.2	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.011	7.7	N1
J RANGE	SSJRN003	SSJRN003_OCT11A	4616350.92	371959.2	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.017	0.14	N1
J RANGE	SSJRN003	SSJRN003_OCT11A	4616350.92	371959.2	10/13/2011	SW6020	Nitroglycerin	1600	J	UG/KG	609	1990	N1
J RANGE	SSJRN003	SSJRN003_OCT11B	4616350.92	371959.2	10/13/2011	SW6020	Zinc	23.0		MG/KG	0.059	1.1	FR1
J RANGE	SSJRN003	SSJRN003_OCT11B	4616350.92	371959.2	10/13/2011	SW6020	Lead	53.5		MG/KG	0.13	5.4	FR1
J RANGE	SSJRN003	SSJRN003_OCT11B	4616350.92	371959.2	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0044	1.1	FR1
J RANGE	SSJRN003	SSJRN003_OCT11B	4616350.92	371959.2	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.0086	9.6	FR1
J RANGE	SSJRN003	SSJRN003_OCT11B	4616350.92	371959.2	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.11	FR1
J RANGE	SSJRN003	SSJRN003_OCT11B	4616350.92	371959.2	10/13/2011	SW6020	Nitroglycerin	2450	J	UG/KG	609	1990	FR1
J RANGE	SSJRN003	SSJRN003_OCT11C	4616350.92	371959.2	10/13/2011	SW6020	Zinc	22.6		MG/KG	0.072	1.3	FR1
J RANGE	SSJRN003	SSJRN003_OCT11C	4616350.92	371959.2	10/13/2011	SW6020	Lead	54.5		MG/KG	0.032	1.3	FR1
J RANGE	SSJRN003	SSJRN003_OCT11C	4616350.92	371959.2	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0054	1.3	FR1
J RANGE	SSJRN003	SSJRN003_OCT11C	4616350.92	371959.2	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.011	9.9	FR1

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Table 1
J Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Eastings	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
J RANGE	SSJRN003	SSJRN003_OCT11C	4616350.92	371959.2	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.016	0.13	FR1
J RANGE	SSJRN003	SSJRN003_OCT11C	4616350.92	371959.2	10/13/2011	SW8330	Nitroglycerin	2290	J	UG/KG	591	1930	FR1
J RANGE	SSJRN004	SSJRN004_OCT11A	4616356.64	371959.22	10/13/2011	SW6020	Zinc	22.2		MG/KG	0.056	1.0	N1
J RANGE	SSJRN004	SSJRN004_OCT11A	4616356.64	371959.22	10/13/2011	SW6020	Lead	57.9		MG/KG	0.025	1.0	N1
J RANGE	SSJRN004	SSJRN004_OCT11A	4616356.64	371959.22	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0042	1.0	N1
J RANGE	SSJRN004	SSJRN004_OCT11A	4616356.64	371959.22	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.0082	9.4	N1
J RANGE	SSJRN004	SSJRN004_OCT11A	4616356.64	371959.22	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.11	N1
J RANGE	SSJRN004	SSJRN004_OCT11A	4616356.64	371959.22	10/13/2011	SW8330	Nitroglycerin	3390	J	UG/KG	600	1960	N1
J RANGE	SSJRN005	SSJRN005_OCT11A	4616362.08	371959.17	10/13/2011	SW6020	Zinc	23.2		MG/KG	0.067	1.2	N1
J RANGE	SSJRN005	SSJRN005_OCT11A	4616362.08	371959.17	10/13/2011	SW6020	Lead	76.5		MG/KG	0.15	6.1	N1
J RANGE	SSJRN005	SSJRN005_OCT11A	4616362.08	371959.17	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0050	1.2	N1
J RANGE	SSJRN005	SSJRN005_OCT11A	4616362.08	371959.17	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.0098	10.3	N1
J RANGE	SSJRN005	SSJRN005_OCT11A	4616362.08	371959.17	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.015	0.12	N1
J RANGE	SSJRN005	SSJRN005_OCT11A	4616362.08	371959.17	10/13/2011	SW8330	Nitroglycerin	1730	J	UG/KG	572	1870	N1
J RANGE	SSJRN005	SSJRN005_OCT11B	4616362.08	371959.17	10/13/2011	SW6020	Zinc	25.7		MG/KG	0.069	1.3	FR1
J RANGE	SSJRN005	SSJRN005_OCT11B	4616362.08	371959.17	10/13/2011	SW6020	Lead	45.7		MG/KG	0.030	1.3	FR1
J RANGE	SSJRN005	SSJRN005_OCT11B	4616362.08	371959.17	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0052	1.3	FR1
J RANGE	SSJRN005	SSJRN005_OCT11B	4616362.08	371959.17	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.010	9.3	FR1
J RANGE	SSJRN005	SSJRN005_OCT11B	4616362.08	371959.17	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.016	0.15	FR1
J RANGE	SSJRN005	SSJRN005_OCT11B	4616362.08	371959.17	10/13/2011	SW8330	Nitroglycerin	2020	J	UG/KG	577	1890	FR1
J RANGE	SSJRN005	SSJRN005_OCT11C	4616362.08	371959.17	10/13/2011	SW6020	Zinc	23.0		MG/KG	0.061	1.1	FR1
J RANGE	SSJRN005	SSJRN005_OCT11C	4616362.08	371959.17	10/13/2011	SW6020	Lead	47.8		MG/KG	0.027	1.1	FR1
J RANGE	SSJRN005	SSJRN005_OCT11C	4616362.08	371959.17	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0046	1.1	FR1
J RANGE	SSJRN005	SSJRN005_OCT11C	4616362.08	371959.17	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.0089	8.6	FR1
J RANGE	SSJRN005	SSJRN005_OCT11C	4616362.08	371959.17	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.014	0.11	FR1
J RANGE	SSJRN005	SSJRN005_OCT11C	4616362.08	371959.17	10/13/2011	SW8330	Nitroglycerin	2100	J	UG/KG	618	2020	FR1
J RANGE	SSJRN006	SSJRN006_OCT11A	4616366.26	371958.99	10/13/2011	SW6020	Zinc	25.8		MG/KG	0.064	1.2	N1
J RANGE	SSJRN006	SSJRN006_OCT11A	4616366.26	371958.99	10/13/2011	SW6020	Lead	34.5		MG/KG	0.028	1.2	N1
J RANGE	SSJRN006	SSJRN006_OCT11A	4616366.26	371958.99	10/13/2011	SW6020	Antimony	ND	U	MG/KG	0.0048	1.2	N1
J RANGE	SSJRN006	SSJRN006_OCT11A	4616366.26	371958.99	10/13/2011	SW6020	Copper	ND	U	MG/KG	0.0094	8.8	N1
J RANGE	SSJRN006	SSJRN006_OCT11A	4616366.26	371958.99	10/13/2011	SW6020	Tungsten	ND	U	MG/KG	0.029	0.23	N1

Notes:

¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit or due to limitation identified in the data validation.

² MDL = Method Detection Limit

³ RL = Reporting Limit

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Table 2
J Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	FLDFLT	Copper	1.0	J	UG/L	0.23	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	FLDFLT	Zinc	2.3	J	UG/L	0.50	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	TOTAL	Copper	1.7	J	UG/L	0.23	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	TOTAL	Zinc	3.2	J	UG/L	0.50	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	TOTAL	Lead	5.5		UG/L	0.024	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	20.0
J RANGE	LYJRN001	LYJRN001_OCT11FA	4616347.89	371959.96	10/12/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	FLDFLT	Copper	2.6	J	UG/L	0.23	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	FLDFLT	Zinc	3.8	J	UG/L	0.50	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	TOTAL	Copper	1.2	J	UG/L	0.23	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	TOTAL	Lead	2.8		UG/L	0.024	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	TOTAL	Zinc	3.2	J	UG/L	0.50	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	20.0
J RANGE	LYJRN002	LYJRN002_OCT11FA	4616355.88	371960.05	10/12/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.58	1.9
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	FLDFLT	Zinc	5.8	J	UG/L	0.50	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	FLDFLT	Copper	6.2	J	UG/L	0.23	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	TOTAL	Zinc	0.88	J	UG/L	0.50	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	TOTAL	Copper	4.7	J	UG/L	0.23	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	20.0
J RANGE	LYJRN003	LYJRN003_OCT11FA	4616368	371939.92	10/11/2011	SW6330	METHOD	Nitroglycerin	ND	UJ	UG/L	0.57	3.1

Notes:
¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit. UJ = The analyte was not detected above this value and is estimated due to matrix interferences.
² MDL = Method Detection Limit
³ RL = Reporting Limit

Table 3
J Range Validated Groundwater Data

Site ID	Location ID	Field Sample ID	Top depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
J RANGE	MW-471S	MW-471S_OCT11FA	84.59	94.59	10/06/2011	SW6020	FLDFLT	Copper	7.3	J	UG/L	0.23	20.0
J RANGE	MW-471S	MW-471S_OCT11FA	84.59	94.59	10/06/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	MW-471S	MW-471S_OCT11FA	84.59	94.59	10/06/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
J RANGE	MW-471S	MW-471S_OCT11FA	84.59	94.59	10/06/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.50	20.0
J RANGE	MW-471S	MW-471S_OCT11UA	84.59	94.59	10/06/2011	SW6020	TOTAL	Copper	3.3	J	UG/L	0.23	20.0
J RANGE	MW-471S	MW-471S_OCT11UA	84.59	94.59	10/06/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	MW-471S	MW-471S_OCT11UA	84.59	94.59	10/06/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
J RANGE	MW-471S	MW-471S_OCT11UA	84.59	94.59	10/06/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
J RANGE	MW-471S	MW-471S_OCT11UA	84.59	94.59	10/06/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
J RANGE	MW-472S	MW-472S_OCT11FA	84.59	94.59	10/06/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9
J RANGE	MW-472S	MW-472S_OCT11FA	85.31	95.31	10/05/2011	SW6020	FLDFLT	Copper	0.27	J	UG/L	0.23	20.0
J RANGE	MW-472S	MW-472S_OCT11FA	85.31	95.31	10/05/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	MW-472S	MW-472S_OCT11FA	85.31	95.31	10/05/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
J RANGE	MW-472S	MW-472S_OCT11FA	85.31	95.31	10/05/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.50	20.0
J RANGE	MW-472S	MW-472S_OCT11UA	85.31	95.31	10/05/2011	SW6020	TOTAL	Copper	1.0	J	UG/L	0.23	20.0
J RANGE	MW-472S	MW-472S_OCT11UA	85.31	95.31	10/05/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	MW-472S	MW-472S_OCT11UA	85.31	95.31	10/05/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
J RANGE	MW-472S	MW-472S_OCT11UA	85.31	95.31	10/05/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
J RANGE	MW-472S	MW-472S_OCT11UA	85.31	95.31	10/05/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
J RANGE	MW-472S	MW-472S_OCT11UA	85.31	95.31	10/05/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9

Notes:
¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit.
² MDL = Method Detection Limit
³ RL = Reporting Limit

Table 4
K Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
K RANGE	SSKRRNG001	SSKRRNG001_OCT11A	4616341.71	372041.94	10/14/2011	SW6020	Lead	12.1		MG/KG	0.024	1.0	N1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11A	4616341.71	372041.94	10/14/2011	SW6020	Copper	27.6		MG/KG	0.0081	1.0	N1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11A	4616341.71	372041.94	10/14/2011	SW6020	Zinc	37.1		MG/KG	0.56	10.1	N1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11A	4616341.71	372041.94	10/14/2011	SW6020	Antimony	ND	U	MG/KG	0.0041	1.0	N1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11A	4616341.71	372041.94	10/14/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.10	N1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11A	4616341.71	372041.94	10/14/2011	SW6020	Nitroglycerin	11800		UG/KG	587	1920	N1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11B	4616341.71	372041.94	10/14/2011	SW6020	Lead	15.2		MG/KG	0.027	1.1	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11B	4616341.71	372041.94	10/14/2011	SW6020	Copper	25.1		MG/KG	0.0091	1.1	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11B	4616341.71	372041.94	10/14/2011	SW6020	Zinc	36.8		MG/KG	0.63	11.4	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11B	4616341.71	372041.94	10/14/2011	SW6020	Antimony	ND	U	MG/KG	0.0047	1.1	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11B	4616341.71	372041.94	10/14/2011	SW6020	Tungsten	ND	U	MG/KG	0.014	0.11	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11B	4616341.71	372041.94	10/14/2011	SW6020	Nitroglycerin	21100		UG/KG	608	1990	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11C	4616341.71	372041.94	10/14/2011	SW6020	Lead	15.5		MG/KG	0.028	1.2	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11C	4616341.71	372041.94	10/14/2011	SW6020	Copper	25.2		MG/KG	0.0094	1.2	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11C	4616341.71	372041.94	10/14/2011	SW6020	Zinc	36.9		MG/KG	0.65	11.8	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11C	4616341.71	372041.94	10/14/2011	SW6020	Antimony	ND	U	MG/KG	0.0048	1.2	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11C	4616341.71	372041.94	10/14/2011	SW6020	Tungsten	ND	U	MG/KG	0.015	0.12	FR1
K RANGE	SSKRRNG001	SSKRRNG001_OCT11C	4616341.71	372041.94	10/14/2011	SW6020	Nitroglycerin	22400		UG/KG	587	1920	FR1
K RANGE	SSKRRNG002	SSKRRNG002_OCT11A	4616346.08	372042.19	10/14/2011	SW6020	Zinc	16.1		MG/KG	0.060	1.1	N1
K RANGE	SSKRRNG002	SSKRRNG002_OCT11A	4616346.08	372042.19	10/14/2011	SW6020	Lead	29.3		MG/KG	0.026	1.1	N1
K RANGE	SSKRRNG002	SSKRRNG002_OCT11A	4616346.08	372042.19	10/14/2011	SW6020	Antimony	ND	U	MG/KG	0.0045	1.1	N1
K RANGE	SSKRRNG002	SSKRRNG002_OCT11A	4616346.08	372042.19	10/14/2011	SW6020	Copper	ND	U	MG/KG	0.0088	9.2	N1
K RANGE	SSKRRNG002	SSKRRNG002_OCT11A	4616346.08	372042.19	10/14/2011	SW6020	Tungsten	ND	U	MG/KG	0.014	0.11	N1
K RANGE	SSKRRNG002	SSKRRNG002_OCT11A	4616346.08	372042.19	10/14/2011	SW6020	Nitroglycerin	2370	J	UG/KG	580	1900	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11A	4616351.28	372042.4	10/18/2011	SW6020	Zinc	13.9		MG/KG	0.056	1.0	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11A	4616351.28	372042.4	10/18/2011	SW6020	Lead	25.5		MG/KG	0.024	1.0	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11A	4616351.28	372042.4	10/18/2011	SW6020	Copper	7.0		MG/KG	0.0081	1.0	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11A	4616351.28	372042.4	10/18/2011	SW6020	Antimony	ND	U	MG/KG	0.0041	1.0	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11A	4616351.28	372042.4	10/18/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.11	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11A	4616351.28	372042.4	10/18/2011	SW6020	Nitroglycerin	2230	J	UG/KG	600	1960	N1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11B	4616351.28	372042.4	10/18/2011	SW6020	Zinc	16.8		MG/KG	0.15	2.7	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11B	4616351.28	372042.4	10/18/2011	SW6020	Lead	29.6		MG/KG	0.032	1.3	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11B	4616351.28	372042.4	10/18/2011	SW6020	Copper	9.5		MG/KG	0.021	2.7	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11B	4616351.28	372042.4	10/18/2011	SW6020	Antimony	ND	U	MG/KG	0.0055	1.3	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11B	4616351.28	372042.4	10/18/2011	SW6020	Tungsten	ND	U	MG/KG	0.017	0.13	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11B	4616351.28	372042.4	10/18/2011	SW6020	Nitroglycerin	2710	J	UG/KG	571	1870	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11C	4616351.28	372042.4	10/18/2011	SW6020	Zinc	17.1		MG/KG	0.15	2.7	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11C	4616351.28	372042.4	10/18/2011	SW6020	Lead	26.3		MG/KG	0.033	1.4	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11C	4616351.28	372042.4	10/18/2011	SW6020	Copper	9.1		MG/KG	0.022	2.7	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11C	4616351.28	372042.4	10/18/2011	SW6020	Antimony	ND	U	MG/KG	0.0056	1.4	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11C	4616351.28	372042.4	10/18/2011	SW6020	Tungsten	ND	U	MG/KG	0.017	0.14	FR1
K RANGE	SSKRRNG003	SSKRRNG003_OCT11C	4616351.28	372042.4	10/18/2011	SW6020	Nitroglycerin	2330	J	UG/KG	602	1970	FR1

K Range

Table 4
K Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
K RANGE	SSKRRNG004	SSKRRNG004_OCT11A	4616355.92	372042.55	10/18/2011	SW6020	Zinc	17.1		MG/KG	0.14	2.5	N1
K RANGE	SSKRRNG004	SSKRRNG004_OCT11A	4616355.92	372042.55	10/18/2011	SW6020	Lead	34.4		MG/KG	0.030	1.3	N1
K RANGE	SSKRRNG004	SSKRRNG004_OCT11A	4616355.92	372042.55	10/18/2011	SW6020	Copper	9.9		MG/KG	0.020	2.5	N1
K RANGE	SSKRRNG004	SSKRRNG004_OCT11A	4616355.92	372042.55	10/18/2011	SW6020	Antimony	ND	U	MG/KG	0.0052	1.3	N1
K RANGE	SSKRRNG004	SSKRRNG004_OCT11A	4616355.92	372042.55	10/18/2011	SW6020	Tungsten	ND	U	MG/KG	0.016	0.13	N1
K RANGE	SSKRRNG004	SSKRRNG004_OCT11A	4616355.92	372042.55	10/18/2011	SW8330	Nitroglycerin	2750	J	UG/KG	619	2020	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11A	4616362	372042.36	10/20/2011	SW6020	Zinc	13.9		MG/KG	0.057	1.0	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11A	4616362	372042.36	10/20/2011	SW6020	Lead	34.3		MG/KG	0.049	2.1	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11A	4616362	372042.36	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0042	1.0	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11A	4616362	372042.36	10/20/2011	SW6020	Copper	ND	U	MG/KG	0.0082	7.8	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11A	4616362	372042.36	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.11	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11A	4616362	372042.36	10/20/2011	SW8330	Nitroglycerin	2360	J	UG/KG	608	1990	N1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11B	4616362	372042.36	10/20/2011	SW6020	Zinc	13.8		MG/KG	0.056	1.0	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11B	4616362	372042.36	10/20/2011	SW6020	Lead	34.7		MG/KG	0.048	2.0	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11B	4616362	372042.36	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0041	1.0	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11B	4616362	372042.36	10/20/2011	SW6020	Copper	ND	U	MG/KG	0.0081	7.6	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11B	4616362	372042.36	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.10	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11B	4616362	372042.36	10/20/2011	SW8330	Nitroglycerin	2240	J	UG/KG	608	1990	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11C	4616362	372042.36	10/20/2011	SW6020	Zinc	15.0		MG/KG	0.080	1.4	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11C	4616362	372042.36	10/20/2011	SW6020	Lead	30.8		MG/KG	0.035	1.4	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11C	4616362	372042.36	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0059	1.4	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11C	4616362	372042.36	10/20/2011	SW6020	Copper	ND	U	MG/KG	0.012	9.5	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11C	4616362	372042.36	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.018	0.14	FR1
K RANGE	SSKRRNG005	SSKRRNG005_OCT11C	4616362	372042.36	10/20/2011	SW8330	Nitroglycerin	2300	J	UG/KG	577	1890	FR1
K RANGE	SSKRRNG006	SSKRRNG006_OCT11A	4616366.35	372042.95	10/20/2011	SW6020	Zinc	22.2		MG/KG	0.15	2.7	N1
K RANGE	SSKRRNG006	SSKRRNG006_OCT11A	4616366.35	372042.95	10/20/2011	SW6020	Lead	35.5		MG/KG	0.32	13.3	N1
K RANGE	SSKRRNG006	SSKRRNG006_OCT11A	4616366.35	372042.95	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0055	1.3	N1
K RANGE	SSKRRNG006	SSKRRNG006_OCT11A	4616366.35	372042.95	10/20/2011	SW6020	Copper	ND	U	MG/KG	0.021	9.7	N1
K RANGE	SSKRRNG006	SSKRRNG006_OCT11A	4616366.35	372042.95	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.017	0.13	N1

Notes:

¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit or due to limitation identified in the data validation.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 5
K Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	FDFLT	Zinc	10.3	J	UG/L	0.50	20.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	FDFLT	Copper	2.9	J	UG/L	0.23	20.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	FDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	FDFLT	Lead	ND	U	UG/L	0.024	2.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	TOTAL	Copper	0.87	J	UG/L	0.23	20.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	TOTAL	Zinc	2.5	J	UG/L	0.50	20.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	LYKRG001	LYKRG001_OCT11FA	4616348.28	372042.38	10/21/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.80	2.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	FDFLT	Copper	0.88	J	UG/L	0.23	20.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	FDFLT	Zinc	1.8	J	UG/L	0.50	20.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	FDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	FDFLT	Lead	ND	U	UG/L	0.024	2.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.23	20.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	LYKRG002	LYKRG002_OCT11FA	4616355.95	372042.03	10/12/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.58	1.9
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	FDFLT	Copper	1.6	J	UG/L	0.23	20.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	FDFLT	Lead	2.2	U	UG/L	0.024	2.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	FDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	FDFLT	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	TOTAL	Copper	1.4	J	UG/L	0.23	20.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	TOTAL	Lead	2.3	U	UG/L	0.024	2.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	LYKRG003	LYKRG003_OCT11FA	4616367.5	372076.56	10/12/2011	SW6330	METHOD	Nitroglycerin	ND	UJ	UG/L	0.59	12.1
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Zinc	2.7	J	UG/L	0.50	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Lead	4.1	U	UG/L	0.024	2.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Copper	7.4	J	UG/L	0.23	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FD	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Lead	3.2	U	UG/L	0.024	2.0
K RANGE	LYKRG004	LYKRG004_OCT11FD	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Zinc	4.9	J	UG/L	0.50	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FD	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Copper	6.0	J	UG/L	0.23	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FD	4616367.19	372011.16	10/12/2011	SW6020	FDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Zinc	1.6	J	UG/L	0.50	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Lead	4.6	U	UG/L	0.024	2.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Copper	6.4	J	UG/L	0.23	20.0
K RANGE	LYKRG004	LYKRG004_OCT11FA	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0

K Range

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Table 5
K Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	LYKRG004	LYKRG004_OCT11UA	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	LYKRG004	LYKRG004_OCT11UA	4616367.19	372011.16	10/12/2011	SW6330	METHOD	Nitroglycerin	ND	UJ	UG/L	0.58	25.8
K RANGE	LYKRG004	LYKRG004_OCT11UD	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Zinc	3.9	J	UG/L	0.50	20.0
K RANGE	LYKRG004	LYKRG004_OCT11UD	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Lead	5.0		UG/L	0.024	2.0
K RANGE	LYKRG004	LYKRG004_OCT11UD	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Copper	6.4	J	UG/L	0.23	20.0
K RANGE	LYKRG004	LYKRG004_OCT11UD	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRG004	LYKRG004_OCT11UD	4616367.19	372011.16	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	LYKRG004	LYKRG004_OCT11UD	4616367.19	372011.16	10/12/2011	SW6330	METHOD	Nitroglycerin	ND	UJ	UG/L	0.58	36.7

Notes:

¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit, UJ = The analyte was not detected above this value and is estimated due to matrix interferences.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 6
K Range Validated Groundwater Data

Site ID	Location ID	Field Sample ID	Top depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	MW-473S	MW-473S_OCT11FA	83.38	93.38	10/05/2011	SW6020	FLDFLT	Copper	0.55	J	UG/L	0.23	20.0
K RANGE	MW-473S	MW-473S_OCT11FA	83.38	93.38	10/05/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-473S	MW-473S_OCT11FA	83.38	93.38	10/05/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-473S	MW-473S_OCT11FA	83.38	93.38	10/05/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	MW-473S	MW-473S_OCT11FD	83.38	93.38	10/05/2011	SW6020	FLDFLT	Copper	0.31	J	UG/L	0.23	20.0
K RANGE	MW-473S	MW-473S_OCT11FD	83.38	93.38	10/05/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-473S	MW-473S_OCT11FD	83.38	93.38	10/05/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-473S	MW-473S_OCT11FD	83.38	93.38	10/05/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	MW-473S	MW-473S_OCT11UA	83.38	93.38	10/05/2011	SW6020	TOTAL	Copper	0.31	J	UG/L	0.23	20.0
K RANGE	MW-473S	MW-473S_OCT11UA	83.38	93.38	10/05/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-473S	MW-473S_OCT11UA	83.38	93.38	10/05/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-473S	MW-473S_OCT11UA	83.38	93.38	10/05/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	MW-473S	MW-473S_OCT11UA	83.38	93.38	10/05/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	MW-473S	MW-473S_OCT11UA	83.38	93.38	10/05/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9
K RANGE	MW-473S	MW-473S_OCT11UD	83.38	93.38	10/05/2011	SW6020	TOTAL	Copper	0.24	J	UG/L	0.23	20.0
K RANGE	MW-473S	MW-473S_OCT11UD	83.38	93.38	10/05/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-473S	MW-473S_OCT11UD	83.38	93.38	10/05/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-473S	MW-473S_OCT11UD	83.38	93.38	10/05/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	MW-473S	MW-473S_OCT11UD	83.38	93.38	10/05/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	MW-473S	MW-473S_OCT11UD	83.38	93.38	10/05/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.59	2.0
K RANGE	MW-474S	MW-474S_OCT11FA	86.44	96.44	10/05/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-474S	MW-474S_OCT11FA	86.44	96.44	10/05/2011	SW6020	FLDFLT	Copper	ND	U	UG/L	0.23	20.0
K RANGE	MW-474S	MW-474S_OCT11FA	86.44	96.44	10/05/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-474S	MW-474S_OCT11FA	86.44	96.44	10/05/2011	SW6020	FLDFLT	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	MW-474S	MW-474S_OCT11UA	86.44	96.44	10/05/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-474S	MW-474S_OCT11UA	86.44	96.44	10/05/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.23	20.0
K RANGE	MW-474S	MW-474S_OCT11UA	86.44	96.44	10/05/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-474S	MW-474S_OCT11UA	86.44	96.44	10/05/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
K RANGE	MW-474S	MW-474S_OCT11UA	86.44	96.44	10/05/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
K RANGE	MW-474S	MW-474S_OCT11UA	86.44	96.44	10/05/2011	SW8330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9

Notes:

¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 7
T Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11A	4621047.58	373702.38	10/20/2011	SW6020	Antimony	0.39	J	MG/KG	0.0052	1.3	N1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11A	4621047.58	373702.38	10/20/2011	SW6020	Lead	23.9		MG/KG	0.31	12.7	N1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11A	4621047.58	373702.38	10/20/2011	SW6020	Copper	30.2		MG/KG	0.020	2.5	N1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11A	4621047.58	373702.38	10/20/2011	SW6020	Zinc	33.0		MG/KG	0.14	2.5	N1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11A	4621047.58	373702.38	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.016	0.17	N1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11A	4621047.58	373702.38	10/20/2011	SW6330	Nitroglycerin	15700		UG/KG	591	1930	N1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11B	4621047.58	373702.38	10/20/2011	SW6020	Antimony	0.45	J	MG/KG	0.0064	1.6	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11B	4621047.58	373702.38	10/20/2011	SW6020	Lead	23.4		MG/KG	0.038	1.6	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11B	4621047.58	373702.38	10/20/2011	SW6020	Zinc	45.8		MG/KG	0.17	3.1	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11B	4621047.58	373702.38	10/20/2011	SW6020	Copper	92.5		MG/KG	0.025	3.1	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11B	4621047.58	373702.38	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.020	0.16	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11B	4621047.58	373702.38	10/20/2011	SW6330	Nitroglycerin	23200		UG/KG	571	1870	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11C	4621047.58	373702.38	10/20/2011	SW6020	Antimony	0.35	J	MG/KG	0.0051	1.3	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11C	4621047.58	373702.38	10/20/2011	SW6020	Lead	22.1		MG/KG	0.030	1.3	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11C	4621047.58	373702.38	10/20/2011	SW6020	Copper	25.6		MG/KG	0.020	2.5	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11C	4621047.58	373702.38	10/20/2011	SW6020	Zinc	30.9		MG/KG	0.14	2.5	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11C	4621047.58	373702.38	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.016	0.13	FR1
T RANGE	SSTRNGA1A	SSTRNG1A_OCT11C	4621047.58	373702.38	10/20/2011	SW6330	Nitroglycerin	18000		UG/KG	571	1870	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11A	4621044.14	373699.09	10/20/2011	SW6020	Copper	14.8		MG/KG	0.023	2.9	N1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11A	4621044.14	373699.09	10/20/2011	SW6020	Lead	20.1		MG/KG	0.035	1.4	N1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11A	4621044.14	373699.09	10/20/2011	SW6020	Zinc	26.0		MG/KG	0.16	2.9	N1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11A	4621044.14	373699.09	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0059	1.4	N1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11A	4621044.14	373699.09	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.018	0.21	N1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11A	4621044.14	373699.09	10/20/2011	SW6330	Nitroglycerin	3660	J	UG/KG	608	1980	N1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11B	4621044.14	373699.09	10/20/2011	SW6020	Copper	12.3		MG/KG	0.017	2.1	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11B	4621044.14	373699.09	10/20/2011	SW6020	Lead	20.8		MG/KG	0.025	1.0	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11B	4621044.14	373699.09	10/20/2011	SW6020	Zinc	25.4		MG/KG	0.11	2.1	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11B	4621044.14	373699.09	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0043	1.0	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11B	4621044.14	373699.09	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.013	0.19	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11B	4621044.14	373699.09	10/20/2011	SW6330	Nitroglycerin	3660	J	UG/KG	598	1960	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11C	4621044.14	373699.09	10/20/2011	SW6020	Zinc	12.4		MG/KG	0.081	1.5	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11C	4621044.14	373699.09	10/20/2011	SW6020	Lead	25.6		MG/KG	0.035	1.5	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11C	4621044.14	373699.09	10/20/2011	SW6020	Copper	6.8		MG/KG	0.012	1.5	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11C	4621044.14	373699.09	10/20/2011	SW6020	Antimony	ND	U	MG/KG	0.0060	1.5	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11C	4621044.14	373699.09	10/20/2011	SW6020	Tungsten	ND	U	MG/KG	0.018	0.15	FR1
T RANGE	SSTRNGA1B	SSTRNG1B_OCT11C	4621044.14	373699.09	10/20/2011	SW6330	Nitroglycerin	4700	J	UG/KG	583	1900	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11A	4621040.45	373695.76	10/20/2011	SW6020	Antimony	0.95	J	MG/KG	0.0043	1.1	N1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11A	4621040.45	373695.76	10/20/2011	SW6020	Tungsten	1.5		MG/KG	0.013	0.11	N1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11A	4621040.45	373695.76	10/20/2011	SW6020	Copper	228		MG/KG	0.84	105	N1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11A	4621040.45	373695.76	10/20/2011	SW6020	Lead	418		MG/KG	0.25	10.5	N1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11A	4621040.45	373695.76	10/20/2011	SW6020	Zinc	54.7	J	MG/KG	5.8	105	N1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11A	4621040.45	373695.76	10/20/2011	SW6330	Nitroglycerin	7120	J	UG/KG	595	1950	N1

T Range

Table 7
T Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11B	4621040.45	373695.76	10/20/2011	SW6020	Tungsten	1.2		MG/KG	0.014	0.11	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11B	4621040.45	373695.76	10/20/2011	SW6020	Antimony	1.3		MG/KG	0.0045	1.1	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11B	4621040.45	373695.76	10/20/2011	SW6020	Copper	116		MG/KG	0.88	110	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11B	4621040.45	373695.76	10/20/2011	SW6020	Zinc	37.8		MG/KG	0.12	2.2	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11B	4621040.45	373695.76	10/20/2011	SW6020	Lead	387		MG/KG	0.26	11.0	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11B	4621040.45	373695.76	10/20/2011	SW6330	Nitroglycerin	6100	J	UG/KG	599	1960	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11C	4621040.45	373695.76	10/20/2011	SW6020	Antimony	1.2	J	MG/KG	0.0053	1.3	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11C	4621040.45	373695.76	10/20/2011	SW6020	Tungsten	1.4		MG/KG	0.016	0.13	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11C	4621040.45	373695.76	10/20/2011	SW6020	Copper	222		MG/KG	1.0	130	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11C	4621040.45	373695.76	10/20/2011	SW6020	Lead	439		MG/KG	0.31	13.0	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11C	4621040.45	373695.76	10/20/2011	SW6020	Zinc	44.1		MG/KG	0.14	2.6	FR1
T RANGE	SSTRNGA1C	SSTRNG1C_OCT11C	4621040.45	373695.76	10/20/2011	SW6330	Nitroglycerin	6230	J	UG/KG	611	2000	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11A	4621036.81	373692.3	10/21/2011	SW6020	Antimony	0.82	J	MG/KG	0.0047	1.1	N1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11A	4621036.81	373692.3	10/21/2011	SW6020	Copper	189		MG/KG	0.091	11.4	N1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11A	4621036.81	373692.3	10/21/2011	SW6020	Zinc	22.7		MG/KG	0.063	1.1	N1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11A	4621036.81	373692.3	10/21/2011	SW6020	Lead	257		MG/KG	0.27	11.4	N1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11A	4621036.81	373692.3	10/21/2011	SW6020	Tungsten	8.3		MG/KG	0.014	0.11	N1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11A	4621036.81	373692.3	10/21/2011	SW6330	Nitroglycerin	11200		UG/KG	577	1890	N1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11B	4621036.81	373692.3	10/21/2011	SW6020	Antimony	1.3		MG/KG	0.0051	1.2	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11B	4621036.81	373692.3	10/21/2011	SW6020	Tungsten	11.9		MG/KG	0.016	0.12	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11B	4621036.81	373692.3	10/21/2011	SW6020	Copper	274		MG/KG	0.099	12.4	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11B	4621036.81	373692.3	10/21/2011	SW6020	Zinc	30.0		MG/KG	0.088	1.2	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11B	4621036.81	373692.3	10/21/2011	SW6020	Lead	314		MG/KG	0.30	12.4	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11B	4621036.81	373692.3	10/21/2011	SW6330	Nitroglycerin	16800		UG/KG	570	1860	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11C	4621036.81	373692.3	10/21/2011	SW6020	Antimony	1.4	J	MG/KG	0.0061	1.5	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11C	4621036.81	373692.3	10/21/2011	SW6020	Copper	268		MG/KG	0.12	14.8	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11C	4621036.81	373692.3	10/21/2011	SW6020	Zinc	31.8		MG/KG	0.081	1.5	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11C	4621036.81	373692.3	10/21/2011	SW6020	Lead	385		MG/KG	0.36	14.8	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11C	4621036.81	373692.3	10/21/2011	SW6020	Tungsten	8.1		MG/KG	0.019	0.15	FR1
T RANGE	SSTRNGA1D	SSTRNG1D_OCT11C	4621036.81	373692.3	10/21/2011	SW6330	Nitroglycerin	12200		UG/KG	618	2020	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11A	4621032.9	373689.03	10/21/2011	SW6020	Antimony	1.4		MG/KG	0.0049	1.2	N1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11A	4621032.9	373689.03	10/21/2011	SW6020	Zinc	27.8		MG/KG	0.066	1.2	N1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11A	4621032.9	373689.03	10/21/2011	SW6020	Lead	378		MG/KG	0.29	12.0	N1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11A	4621032.9	373689.03	10/21/2011	SW6020	Copper	71.8		MG/KG	0.019	2.4	N1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11A	4621032.9	373689.03	10/21/2011	SW6020	Tungsten	ND	U	MG/KG	0.015	1.2	N1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11A	4621032.9	373689.03	10/21/2011	SW6330	Nitroglycerin	21800		UG/KG	588	1920	N1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11B	4621032.9	373689.03	10/21/2011	SW6020	Antimony	1.3	J	MG/KG	0.0063	1.5	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11B	4621032.9	373689.03	10/21/2011	SW6020	Zinc	26.1		MG/KG	0.17	3.1	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11B	4621032.9	373689.03	10/21/2011	SW6020	Lead	319		MG/KG	0.37	13.4	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11B	4621032.9	373689.03	10/21/2011	SW6020	Copper	65.6		MG/KG	0.025	3.1	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11B	4621032.9	373689.03	10/21/2011	SW6020	Tungsten	ND	U	MG/KG	0.019	1.3	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11B	4621032.9	373689.03	10/21/2011	SW6330	Nitroglycerin	19800		UG/KG	571	1870	FR1

T Range

Table 7
T Range Validated Soil Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³	Sample Type
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11C	4621032.9	373689.03	10/21/2011	SW6020	Antimony	1.1	J	MG/KG	0.0082	1.5	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11C	4621032.9	373689.03	10/21/2011	SW6020	Zinc	21.6		MG/KG	0.083	1.5	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11C	4621032.9	373689.03	10/21/2011	SW6020	Lead	260		MG/KG	0.36	15.2	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11C	4621032.9	373689.03	10/21/2011	SW6020	Copper	36.4		MG/KG	0.012	1.5	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11C	4621032.9	373689.03	10/21/2011	SW6020	Tungsten	ND	U	MG/KG	0.019	1.1	FR1
T RANGE	SSTRNGA1E	SSTRNG1E_OCT11C	4621032.9	373689.03	10/21/2011	SW6330	Nitroglycerin	20800		UG/KG	811	2000	FR1
T RANGE	SSTRNGA2A	SSTRNG2A_OCT11A	4621029.53	373685.65	10/21/2011	SW6020	Lead	20.3		MG/KG	0.029	1.2	N1
T RANGE	SSTRNGA2A	SSTRNG2A_OCT11A	4621029.53	373685.65	10/21/2011	SW6020	Zinc	37.6		MG/KG	0.13	2.4	N1
T RANGE	SSTRNGA2A	SSTRNG2A_OCT11A	4621029.53	373685.65	10/21/2011	SW6020	Antimony	ND	U	MG/KG	0.0049	1.2	N1
T RANGE	SSTRNGA2A	SSTRNG2A_OCT11A	4621029.53	373685.65	10/21/2011	SW6020	Copper	ND	U	MG/KG	0.0096	13.1	N1
T RANGE	SSTRNGA2A	SSTRNG2A_OCT11A	4621029.53	373685.65	10/21/2011	SW6020	Tungsten	ND	U	MG/KG	0.015	0.12	N1

Notes:

¹ Qualifiers: U = Non-detect J = Value is estimated less than the reporting limit or due to limitation identified in the data validation.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 8
T Range Validated Lysimeter Data

Site ID	Location ID	Field Sample ID	Northing	Easting	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
T RANGE	LYTRNG011	LYTR011_OCT11FA	4621043.62	373700.93	10/11/2011	SW6020	FLDFLT	Zinc	0.51	J	UG/L	0.50	20.0
T RANGE	LYTRNG011	LYTR011_OCT11FA	4621043.62	373700.93	10/11/2011	SW6020	FLDFLT	Copper	1.9	J	UG/L	0.23	20.0
T RANGE	LYTRNG011	LYTR011_OCT11FA	4621043.62	373700.93	10/11/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	LYTRNG011	LYTR011_OCT11FA	4621043.62	373700.93	10/11/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG011	LYTR011_OCT11UA	4621043.62	373700.93	10/11/2011	SW6020	TOTAL	Copper	0.98	J	UG/L	0.23	20.0
T RANGE	LYTRNG011	LYTR011_OCT11UA	4621043.62	373700.93	10/11/2011	SW6020	TOTAL	Zinc	1.7	J	UG/L	0.50	20.0
T RANGE	LYTRNG011	LYTR011_OCT11UA	4621043.62	373700.93	10/11/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	LYTRNG011	LYTR011_OCT11UA	4621043.62	373700.93	10/11/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG011	LYTR011_OCT11UA	4621043.62	373700.93	10/11/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
T RANGE	LYTRNG011	LYTR011_OCT11UA	4621043.62	373700.93	10/11/2011	SW6020	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9
T RANGE	LYTRNG012	LYTR012_OCT11FA	4621035.71	373692.76	10/11/2011	SW6020	FLDFLT	Copper	4.9	J	UG/L	0.23	20.0
T RANGE	LYTRNG012	LYTR012_OCT11FA	4621035.71	373692.76	10/11/2011	SW6020	FLDFLT	Zinc	6.4	J	UG/L	0.50	20.0
T RANGE	LYTRNG012	LYTR012_OCT11FA	4621035.71	373692.76	10/11/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	LYTRNG012	LYTR012_OCT11FA	4621035.71	373692.76	10/11/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG012	LYTR012_OCT11UA	4621035.71	373692.76	10/11/2011	SW6020	TOTAL	Copper	0.72	J	UG/L	0.23	20.0
T RANGE	LYTRNG012	LYTR012_OCT11UA	4621035.71	373692.76	10/11/2011	SW6020	TOTAL	Zinc	3.7	J	UG/L	0.50	20.0
T RANGE	LYTRNG012	LYTR012_OCT11UA	4621035.71	373692.76	10/11/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	LYTRNG012	LYTR012_OCT11UA	4621035.71	373692.76	10/11/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG012	LYTR012_OCT11UA	4621035.71	373692.76	10/11/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
T RANGE	LYTRNG012	LYTR012_OCT11UA	4621035.71	373692.76	10/11/2011	SW6020	METHOD	Nitroglycerin	ND	UJ	UG/L	0.57	3.0
T RANGE	LYTRNG013	LYTR013_OCT11FA	4621028.28	373684.12	10/11/2011	SW6020	FLDFLT	Zinc	12.2	J	UG/L	0.50	20.0
T RANGE	LYTRNG013	LYTR013_OCT11FA	4621028.28	373684.12	10/11/2011	SW6020	FLDFLT	Copper	3.2	J	UG/L	0.23	20.0
T RANGE	LYTRNG013	LYTR013_OCT11FA	4621028.28	373684.12	10/11/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	LYTRNG013	LYTR013_OCT11FA	4621028.28	373684.12	10/11/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG013	LYTR013_OCT11UA	4621028.28	373684.12	10/11/2011	SW6020	TOTAL	Copper	1.7	J	UG/L	0.23	20.0
T RANGE	LYTRNG013	LYTR013_OCT11UA	4621028.28	373684.12	10/11/2011	SW6020	TOTAL	Zinc	7.5	J	UG/L	0.50	20.0
T RANGE	LYTRNG013	LYTR013_OCT11UA	4621028.28	373684.12	10/11/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	LYTRNG013	LYTR013_OCT11UA	4621028.28	373684.12	10/11/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG013	LYTR013_OCT11UA	4621028.28	373684.12	10/11/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
T RANGE	LYTRNG013	LYTR013_OCT11UA	4621028.28	373684.12	10/11/2011	SW6020	METHOD	Nitroglycerin	ND	U	UG/L	0.58	1.9

Notes:

¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit, UJ = The analyte was not detected above this value and is estimated due matrix interferences.

² MDL = Method Detection Limit

³ RL = Reporting Limit

Table 9
T Range Validated Groundwater Data

Site ID	Location ID	Field Sample ID	Top depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
T RANGE	MW-467S	MW-467S_OCT11FA	124.94	134.94	10/10/2011	SW6020	FLDFLT	Zinc	18.2	J	UG/L	0.50	20.0
T RANGE	MW-467S	MW-467S_OCT11FA	124.94	134.94	10/10/2011	SW6020	FLDFLT	Copper	2.2	J	UG/L	0.23	20.0
T RANGE	MW-467S	MW-467S_OCT11FA	124.94	134.94	10/10/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	MW-467S	MW-467S_OCT11FA	124.94	134.94	10/10/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
T RANGE	MW-467S	MW-467S_OCT11UA	124.94	134.94	10/10/2011	SW6020	TOTAL	Zinc	1.7	J	UG/L	0.50	20.0
T RANGE	MW-467S	MW-467S_OCT11UA	124.94	134.94	10/10/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	MW-467S	MW-467S_OCT11UA	124.94	134.94	10/10/2011	SW6020	TOTAL	Copper	ND	U	UG/L	0.23	20.0
T RANGE	MW-467S	MW-467S_OCT11UA	124.94	134.94	10/10/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
T RANGE	MW-467S	MW-467S_OCT11UA	124.94	134.94	10/10/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
T RANGE	MW-467S	MW-467S_OCT11UA	124.94	134.94	10/10/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9
T RANGE	MW-489S	MW-489S_OCT11FA	124.58	134.58	10/11/2011	SW6020	FLDFLT	Copper	0.88	J	UG/L	0.23	20.0
T RANGE	MW-489S	MW-489S_OCT11FA	124.58	134.58	10/11/2011	SW6020	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	MW-489S	MW-489S_OCT11FA	124.58	134.58	10/11/2011	SW6020	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
T RANGE	MW-489S	MW-489S_OCT11FA	124.58	134.58	10/11/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
T RANGE	MW-489S	MW-489S_OCT11UA	124.58	134.58	10/11/2011	SW6020	TOTAL	Copper	0.30	J	UG/L	0.23	20.0
T RANGE	MW-489S	MW-489S_OCT11UA	124.58	134.58	10/11/2011	SW6020	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	MW-489S	MW-489S_OCT11UA	124.58	134.58	10/11/2011	SW6020	TOTAL	Lead	ND	U	UG/L	0.024	2.0
T RANGE	MW-489S	MW-489S_OCT11UA	124.58	134.58	10/11/2011	SW6020	TOTAL	Tungsten	ND	U	UG/L	0.16	2.0
T RANGE	MW-489S	MW-489S_OCT11UA	124.58	134.58	10/11/2011	SW6020	TOTAL	Zinc	ND	U	UG/L	0.50	20.0
T RANGE	MW-489S	MW-489S_OCT11UA	124.58	134.58	10/11/2011	SW6330	METHOD	Nitroglycerin	ND	U	UG/L	0.57	1.9

Notes:

¹ Qualifiers: U = Non-detect. J = Value is estimated less than the reporting limit.

² MDL = Method Detection Limit

³ RL = Reporting Limit

T Range

Table 10
J, K and T Ranges Validated STAPP Data

Site ID	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Copper	17.2	J	UGL	1.6	25.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Magnesium	18800		UGL	64.0	5000
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Potassium	2260	J	UGL	180	5000
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Barium	25.6	J	UGL	5.2	200
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Chromium, Total	3.1	J	UGL	0.55	10.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Nickel	3.7	J	UGL	1.8	40.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Zinc	30200		UGL	0.75	20.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Calcium	33800		UGL	120	5000
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Lead	39.2		UGL	5.4	10.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Aluminum	3990		UGL	39.0	200
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Iron	3990		UGL	39.0	200
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Sodium	4610	J	UGL	51.0	5000
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Vanadium	6.4	J	UGL	1.6	50.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Manganese	68.8		UGL	1.9	15.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Boron	71.9	J	UGL	1.7	100
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Cobalt	ND	U	UGL	0.92	50.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Molybdenum	ND	U	UGL	1.5	10.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Selenium	ND	U	UGL	6.1	35.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6010B	TOTAL	Silver	ND	U	UGL	2.1	10.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6020	TOTAL	Cadmium	0.69	J	UGL	0.046	2.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6020	TOTAL	Antimony	54.0		UGL	0.073	20.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6020	TOTAL	Arsenic	ND	U	UGL	0.18	4.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6020	TOTAL	Beryllium	ND	U	UGL	0.092	2.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6020	TOTAL	Thallium	ND	U	UGL	0.079	2.0
J RANGE	WLJUNG	WLJSTAPP_OCT11	10/13/2011	SW6020	TOTAL	Tungsten	ND	U	UGL	0.16	2.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Mercury	ND	U	UGL	0.066	0.20
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Copper	101		UGL	1.6	25.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Nickel	17.2	J	UGL	1.8	40.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Cobalt	2.3	J	UGL	0.92	50.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Zinc	20300		UGL	0.75	20.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Potassium	2040	J	UGL	180	5000
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Barium	21.1	J	UGL	5.2	200
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Boron	218		UGL	1.7	100
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Magnesium	23200		UGL	64.0	5000
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Manganese	33.2		UGL	1.9	15.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Sodium	5920		UGL	51.0	5000
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Lead	62.1		UGL	5.4	10.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Calcium	78300		UGL	120	5000
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Aluminum	ND	U	UGL	39.0	200
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Chromium, Total	ND	U	UGL	0.55	10.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Iron	ND	U	UGL	39.0	200
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Molybdenum	ND	U	UGL	1.5	10.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Selenium	ND	U	UGL	6.1	35.0

J/K/T Range

Page 1 of 2

Table 10
J, K and T Ranges Validated STAPP Data

Site ID	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier ¹	Units	MDL ²	RL ³
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Silver	ND	U	UGL	2.1	10.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Vanadium	ND	U	UGL	1.6	50.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Cadmium	2.8		UGL	0.046	2.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Antimony	250		UGL	0.073	20.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Arsenic	ND	U	UGL	0.092	2.5
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Beryllium	ND	U	UGL	0.18	4.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Thallium	ND	U	UGL	0.079	2.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Tungsten	ND	U	UGL	0.16	2.0
K RANGE	WLKRNG	WLKRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Mercury	ND	U	UGL	0.066	0.20
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Chromium, Total	0.70	J	UGL	0.55	10.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Vanadium	1.7	J	UGL	1.6	50.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Manganese	118		UGL	1.9	15.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Iron	121	J	UGL	39.0	200
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Calcium	157000		UGL	120	5000
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Magnesium	27900		UGL	64.0	5000
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Barium	33.1	J	UGL	5.2	200
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Zinc	49900		UGL	0.75	20.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Copper	5.3	J	UGL	1.6	25.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Boron	72.0	J	UGL	1.7	100
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Sodium	72900		UGL	51.0	5000
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Potassium	7410		UGL	180	5000
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Lead	87.2		UGL	5.4	10.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Aluminum	ND	U	UGL	39.0	200
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Cobalt	ND	U	UGL	0.92	50.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Molybdenum	ND	U	UGL	1.5	10.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Nickel	ND	U	UGL	1.8	40.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Selenium	ND	U	UGL	6.1	35.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6010B	TOTAL	Silver	ND	U	UGL	2.1	10.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Cadmium	1.2	J	UGL	0.046	2.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Antimony	141		UGL	0.073	20.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Tungsten	4.3		UGL	0.16	2.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Arsenic	ND	U	UGL	0.092	2.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Beryllium	ND	U	UGL	0.092	2.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW6020	TOTAL	Thallium	ND	U	UGL	0.079	2.0
T RANGE	WLTRNG	WLTRSTAPP_OCT11	10/12/2011	SW7470A	TOTAL	Mercury	ND	U	UGL	0.066	0.20

Notes:
¹ Qualifiers: U = Non-detect, J = Value is estimated less than the reporting limit.
² MDL = Method Detection Limit
³ RL = Reporting Limit



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION I

5 Post Office Square, Suite 100
Boston, MA 02109-3912

31 January 2012

MAJ Shawn Cody
Program Manager
Army National Guard
Impact Area Groundwater Study Program Office
PB 0516 West Outer Road
Camp Edwards, MA 02542-5003

RE: EPA Comments on Draft Juliet, Kilo, and Tango Ranges 2011 Environmental Sampling and Analysis Report Sampling May 2011 through October 2011

Dear MAJ Cody:

EPA has reviewed the above-referenced report and has the following comments which are attached. Please do not hesitate to contact me if you have any questions.

Sincerely,

Lynne A. Jennings
MMR Team Leader

Cc: L. Pinaud/MassDEP
J. Dolan
D. Moyer
B. Lim
T. Conway
R. Fein

**EPA COMMENTS ON DRAFT JULIET, KILO, AND TANGO RANGES 2011
ENVIRONMENTAL SAMPLING AND ANALYSIS REPORT
SAMPLING MAY 2011 THROUGH OCTOBER 2011**

GENERAL COMMENTS

Please include the pH results in the report.

SPECIFIC COMMENTS

Pg 1, Section 1.0, par 3 – Please reference the approved plans e.g. specify the approval date.

Pg 3, Section 3.1 – Please list the pH results.

Pg 3, Section 3.2, par 1 – Summarize the sample collection protocol, and specify whether the pore water samples were filtered or unfiltered.

Pg 4, Section 3.3 - Summarize the sample collection protocol, and specify whether the pore water samples were filtered or unfiltered.

Pg 5, Sections 5.2 and 5.3 – Please state that no interim action levels were exceeded during the May and October sampling events.

Pg 5, Section 6.1 - Please plot trends over time for each decision unit rather than presenting the average soil concentrations.

Pg 7, Section 6.3, par 2 – Please delete the last two sentences as this is conjecture. As you are aware, MW-467S should have been re-sampled after the lead detection observed from March 2010. The lead detection may have been anomalous, but it may have been representative of actual conditions.

Pg 9 – Delete the last sentence.

FINAL



DEPARTMENTS OF THE ARMY
MASSACHUSETTS ARMY NATIONAL GUARD TRAINING SITE CAMP EDWARDS
CAMP EDWARDS, MA 02542-5003

26 March, 2012

Lynne Jennings
US EPA Region 1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Re: Response to EPA Comments on the J, K, and T Ranges 2011 Environmental Sampling and Analysis Report

Dear Ms. Jennings,

Attached please find our responses to your agency's comments on the J, K, and T Ranges 2011 Environmental Sampling and Analysis Report. The responses do not require any changes to the document so generation of a revised document is not planned. We will however incorporate several of the suggestions into the next report.

Copies of this letter will be sent to Leonard Pinaud (MassDEP), Jane Dolan (EPA), Shawn Cody (MANG/NGB), Ben Gregson (IAGWSP), Camp Edwards Range Control, and Jay Ehret (Army Corps of Engineers).

If you have any questions or comments, please do not hesitate to contact me at (508) 968-5885.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard M. Bertone", is written over a horizontal line. The signature is stylized and cursive.

Richard M. Bertone
LTC EN MAARNG
Deputy Post Commander

Response to Comments

GENERAL COMMENTS

Please include the pH results in the report.

Response: Pore water pH readings are included in the report. Soil pH readings are not part of the environmental sampling program, they are conducted by Range Control and the results are available on the inspection forms generated and maintained by Range Control. Copies of the inspection forms from J, K, and T Ranges with the pH measurements from April and October 2011 are attached.

SPECIFIC COMMENTS

Pg I, Section 1.0, par 3 - Please reference the approved plans e.g. specify the approval date.

Response: The J, K, and T Ranges 2011 Environmental Sampling and Analysis Report documents work conducted as per the March 2011 and September 2011 versions of the Operations Maintenance and Monitoring Plans (OMMPs) for J, K, and T Ranges. Future reports will reference the version of the plan under which the sampling was conducted.

Pg 3, Section 3.1 - Please list the pH results.

Response: See response to the General Comment above.

Pg 3, Section 3.2, par 1 -Summarize the sample collection protocol, and specify whether the pore water samples were filtered or unfiltered.

Response: The text in attachments 1 and 2 provides more detail on the pore water sample collection than the referenced section does. This includes a description of filtered and unfiltered samples. In brief, metals were analyzed using both filtered and unfiltered samples to determine the impact of solids on the results, nitroglycerine analyses were conducted only on unfiltered samples. For more details on pore water sampling, please refer to the attached SOP provided by the manufacturer of the pan lysimeters.

Pg 4, Section 3.3 - Summarize the sample collection protocol, and specify whether the pore water samples were filtered or unfiltered.

Response: See response to comment above.

Pg 5, Sections 5.2 and 5.3 - Please state that no interim action levels were exceeded during the May and October sampling events.

Response: Agreed, interim action levels were not exceeded in pore water or groundwater in either of the two sampling events covered by this report. The text as written refers to the entire sampling period covered by the report. No change is needed.

Pg 5, Section 6.1 - Please plot trends over time for each decision unit rather than presenting the average soil concentrations.

Response: Only three soil sampling events have occurred on J and K Ranges. While that is technically enough to plot a trend if one existed, the data does not yet show a trend for lead concentrations. We can add charts with trend lines for lead to the next report. It is clear without a chart that nitroglycerine concentrations increased in 2011 on J and K Ranges. However, this is probably due to samples being collected within days after the ranges were used. Plotting trends in data that is so readily influenced by recent events has little value. As per the EPA's August 29, 2011 letter and discussions at the SARWG meetings, October 2011 was the last sampling event to include nitroglycerine so extending the data set for trend analysis is not planned.

Pg 7, Section 6.3, par 2 - Please delete the last two sentences as this is conjecture. As you are aware, MW-467S should have been re-sampled after the lead detection observed from March 2010. The lead detection may have been anomalous, but it may have been representative of actual conditions.

Response: Well MW-467S was resampled. The detection of lead occurred in March 2010 and the well was sampled again in October 2010. The wells at J and K Range were also sampled in March 2010 but were not resampled in October 2010 because nothing of interest was detected in them. The text is accurate as written and is not conjecture. A one-time detection sandwiched between several results with no detections is, by definition, anomalous. MANG stands by the concepts in the text as written and deletion of the last two sentences is not appropriate.

Pg 9 - Delete the last sentence.

Response: The sentence is accurate as written. When T Range is converted to a "copper only" range, further sampling will not be conducted under the current T Range OMMP. A new sampling plan will be developed and implemented.

Massachusetts Army National Guard Training Site
Headquarters, Camp Edwards
Range Control
Bldg 4020, Frank Perkins Road
Camp Edwards, Massachusetts 02542-5003

Date of Testing: 29 April 2011

PH Testing Results for J-Range												
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Firing Lane	7.31	7.26	6.69	6.93	6.55	6.51	6.4	6.06	6.21	6.37	7.2	7.33
Berm	7.18	7.21	7.27							6.65	6.59	6.42
STAPP	6.93	7.1	7.37	6.82	6.63	7.08	6.94	6.57	6.03	6.24	7.09	7.18

Printed Name _____

Signature of Soldier Conducting PH Testing _____

**Take a total of 6-12 samples along the entire firing line, 6-12 samples along the berm and 6-12 samples along front of STAPP System.

***Required PH Level by OMMP: 6.5 - 8.5

Massachusetts Army National Guard Training Site
Headquarters, Camp Edwards
Range Control
Bldg 4020, Frank Perkins Road
Camp Edwards, Massachusetts 02542-5003

Date of Testing: 29 April 2011

PH Testing Results for K-Range												
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Firing Lane	6.31	7.09	6.68	6.53	6.24	6.48	6.89	6.43	7.09	7.41	7.39	7.28
Berm	7.09	6.79	6.83							6.63	6.74	7.01
STAPP	6.9	7.09	7.21	7.28	7.21	7.11	6.98	6.91	6.89	6.63	6.72	6.81

Printed Name _____

Signature of Soldier Conducting PH Testing _____

**Take a total of 6-12 samples along the entire firing line, 6-12 samples along the berm and 6-12 samples along front of STAPP System.

***Required PH Level by OMMP: 6.5 - 8.5

Massachusetts Army National Guard Training Site
Headquarters, Camp Edwards
Range Control
Bldg 4020, Frank Perkins Road
Camp Edwards, Massachusetts 02542-5003

Date of Testing: 29 April 2011

PH Testing Results for T-Range												
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Firing Lane	5.63	5.77	5.85	5.43	5.8	5.58	5.67	5.85	5.67	6.18	5.77	5.7
Berm	5.89	5.87	5.88	5.9	5.83	5.5	6.43	5.45	5.96	6.12	5.69	5.2
STAPP	5.71	5.8	6.09	6.21	6.36	6.76	6.29	7.02	6.99	7.25	6.84	7.05

Printed Name _____

Signature of Soldier Conducting PH Testing _____

**Take a total of 6-12 samples along the entire firing line, 6-12 samples along the berm and 6-12 samples along front of STAPP System.

***Required PH Level by OMMP: 6.5 - 8.5

Camp Edwards Range Control

Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

A. Administrative Information	
Name:	Date:
Range (circle one): Juliet / Kilo / Tango	

B. Range Maintenance			
Location	Maintenance needed		Maintenance conducted
1. STAPP (identify which; Cover, Seem, support frame.)	YES	NO	
2. Water Removal	YES	NO	(How many gallons pumped / what is current depth)
2. Toe Boxes	YES	NO	
3. Target Line	YES	NO	
4. Firing Line	YES	NO	
5. Range Floor	YES	NO	
6. Berm	YES	NO	
7. Issues or concerns not address above:			

C. Signature	
Range Control Personnel:	NOTE: Ensure from is signed and placed in appropriate Range Binder.

Camp Edwards Range Control Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

A. Administrative Information		
Name: SSG Nicole DiPasquale	Date: 31 October 2011	
Range (circle one): Juliet / Kilo / Tango		

B. PH Testing Results												
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Firing Line	6.45	6.58	6.39	6.06	6.23	6.18	5.48	5.89	5.57	5.62	5.35	5.76
Berm	5.73	5.77	5.85	5.72	5.79	5.70	5.64	5.52	5.64	5.92	6.17	6.21
STAPP	7.08	7.66	7.57	7.26	7.58	7.80	7.79	7.69	6.96	6.27	6.53	5.95
Take a total of 6-12 samples along the entire firing line, 6-12 samples along the berm and 6-12 samples along front of STAPP System. *Required PH Level by OMMP: 6.5 - 8.5												

C Lime Spread/Type of Lime		
**Lime will be applied before peak training season to increase its effectiveness/ applied as need after annual pH check.		
Date	Type of Lime	How Spread/ Rate
Firing Line PH Totals: 71.56	Divide by 12 Samples Taken: 5.96	Ave: 5.96 High: 6.58 Low: 5.35
STAPP PH Totals: 86.14	Divide by 12 Samples Taken: 7.17	Ave: 7.17 High: 7.80 Low: 5.95

D. Signature
Signature of Soldier Conducting PH Testing:

Camp Edwards Range Control
Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

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Camp Edwards Range Control

Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

A. Administrative Information	
Name:	Date:
Range (circle one): Juliet / Kilo / Tango	

B. Range Maintenance			
Location	Maintenance needed		Maintenance conducted
1. STAPP (identify which; Cover, Seem, support frame.)	YES	NO	
2. Water Removal	YES	NO	(How many gallons pumped / what is current depth)
2. Toe Boxes	YES	NO	
3. Target Line	YES	NO	
4. Firing Line	YES	NO	
5. Range Floor	YES	NO	
6. Berm	YES	NO	
7. Issues or concerns not address above:			

C. Signature	
Range Control Personnel:	NOTE: Ensure from is signed and placed in appropriate Range Binder.

Camp Edwards Range Control Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

A. Administrative Information		
Name: SSG Nicole DiPasquale	Date: 31 October 2011	
Range (circle one): Juliet / <u>Kilo</u> / Tango		

B. PH Testing Results												
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Firing Line	5.41	5.32	5.87	5.81	4.87	5.13	5.30	6.83	5.13	5.13	5.18	5.92
Berm	6.41	6.23	6.04	6.38	6.09	6.31	5.59	5.59	5.47	5.42	5.47	5.58
STAPP	6.19	5.89	6.12	6.21	6.07	6.07	6.23	5.67	6.25	6.39	6.62	6.50
Take a total of 6-12 samples along the entire firing line, 6-12 samples along the berm and 6-12 samples along front of STAPP System. *Required PH Level by OMMP: 6.5 - 8.5												

C Lime Spread/Type of Lime		
**Lime will be applied before peak training season to increase its effectiveness/ applied as need after annual pH check.		
Date	Type of Lime	How Spread/ Rate
Firing Line PH Totals: 65.90	Divide by 12 Samples Taken: 5.49	Ave: 5.49 High: 6.83 Low: 4.87
STAPP PH Totals: 74.21	Divide by 12 Samples Taken: 6.18	Ave: 6.18 High: 6.62 Low: 5.67

D. Signature
Signature of Soldier Conducting PH Testing:

Camp Edwards Range Control
Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

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Camp Edwards Range Control

Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

A. Administrative Information	
Name:	Date:
Range (circle one): Juliet / Kilo / Tango	

B. Range Maintenance			
Location	Maintenance needed		Maintenance conducted
1. STAPP (identify which; Cover, Seem, support frame.)	YES	NO	(How many gallons pumped / what is current depth)
2. Water Removal	YES	NO	
2. Toe Boxes	YES	NO	
3. Target Line	YES	NO	
4. Firing Line	YES	NO	
5. Range Floor	YES	NO	
6. Berm	YES	NO	
7. Issues or concerns not address above:			

C. Signature	
Range Control Personnel:	NOTE: Ensure from is signed and placed in appropriate Range Binder.

Camp Edwards Range Control Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

A. Administrative Information		
Name: SGT Lori Page	Date: 31 October 2011	
Range (circle one): Juliet / Kilo / Tango		

B. PH Testing Results												
Sample Number	1	2	3	4	5	6	7	8	9	10	11	12
Firing Line	6.02	6.18	6.01	6.23	6.18	6.14	6.13	6.15	6.28	6.46	6.33	5.69
Berm	5.76	5.96	5.92	5.80	5.87	5.87	6.09	6.28	6.34	5.97	6.42	6.14
STAPP	5.41	6.10	6.19	6.47	6.45	6.45	6.40	6.33	6.01	5.95	6.07	5.61
Take a total of 6-12 samples along the entire firing line, 6-12 samples along the berm and 6-12 samples along front of STAPP System. *Required PH Level by OMMP: 6.5 - 8.5												

C Lime Spread/Type of Lime		
**Lime will be applied before peak training season to increase its effectiveness/ applied as need after annual pH check.		
Date	Type of Lime	How Spread/ Rate
Firing Line PH Totals: 73.80	Divide by 12 Samples Taken: 6.15	Ave: 6.15 High: 6.46 Low: 5.69
STAPP PH Totals: 73.44	Divide by 12 Samples Taken: 6.12	Ave: 6.12 High: 6.47 Low: 5.41

D. Signature
Signature of Soldier Conducting PH Testing:

Camp Edwards Range Control
Range Maintenance/ pH Testing / Lime Spread Form (Appendix D)

(This form is to be completed by Camp Edwards Range Control personnel when range maintenance is conducted and on a annual basis, in March, April or as needed for PH testing. Once completed file in appropriate range binder for submission.)

--

1960

OPERATING INSTRUCTIONS

1960 Pan Lysimeter

July 2009



(Figure 1) - Pan Lysimeter



(Figure 2) - Pan Lysimeter (INSIDE)

A Pan Lysimeter (pore water sampler) is the perfect device for taking samples in conditions of soil saturation and subsequent drainage conditions.

SOILMOISTURE EQUIPMENT CORP.
P.O. Box 30025, Santa Barbara, CA 93105 U.S.A.
Telephone 805-964-3525 - Fax No. 805-683-2189
Email: sales@soilmoisture.com - Website: <http://www.soilmoisture.com>



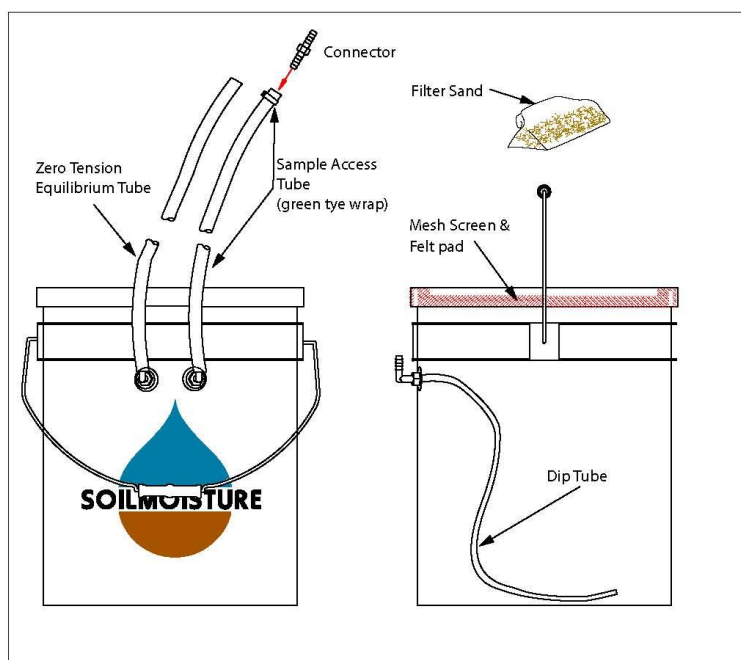
WARRANTY & LIABILITY

Soilmoisture Equipment Corp. (SEC) warrants all products manufactured by SEC to be free from defects in materials and workmanship under normal use and service for twelve (12) months from the date of invoice provided the section below has been met.

Soilmoisture Equipment Corp. (SEC) is not liable for any damages, actual or inferred, caused by misuse or improper handling of its products. SEC products are designed to be used solely as described in these product operating instructions by a prudent individual under normal operating conditions in applications intended for use by this product.

AQUAINT YOURSELF WITH THE PARTS

The Soilmoisture Model 1960 Pan Lysimeter is shipped fully assembled.



(Figure 3) - Parts of the Pan Lysimeter

SPECIFICATIONS:

1960 PAN LYSIMETER Diameter 12" (30.5 cm), Height 15" (38.1 cm)
VOLUME: 5 Gallons

THEORY OF OPERATION

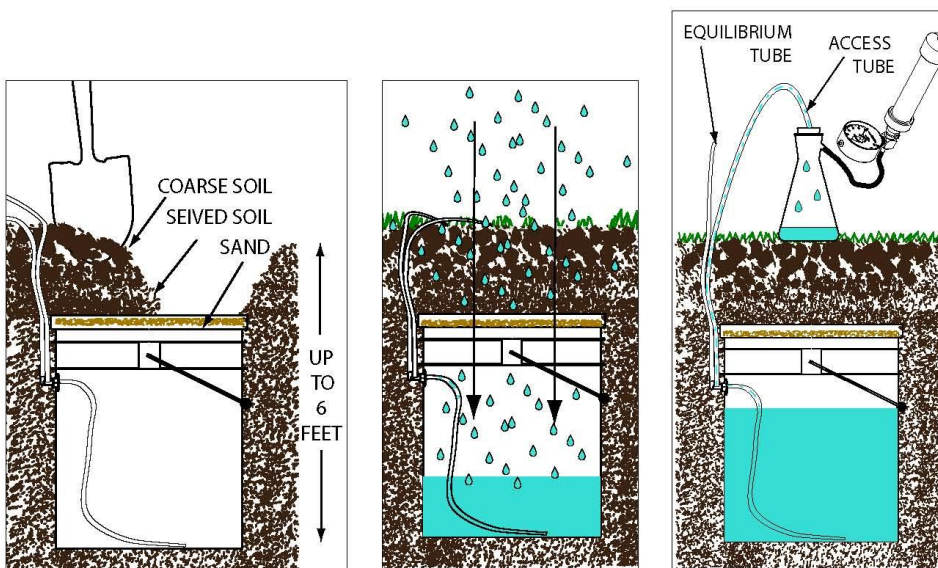
Placed near surface or at some depths up to 6 feet, it provides a good way to collect soluble agrochemical surface residue, near surface salt accumulations (created over the dry season), or in gaining a better understanding of the infiltration properties of a particular soil type under high flow conditions.

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P.O. Box 30025, Santa Barbara, CA 93105 U.S.A.
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2



HOW TO USE AND OR OPERATE UNIT



(Figure 4) - Dig the hole, refill fine to coarse.

(Figure 5) - Bucket collecting water

(Figure 6) - Collecting a sample

INSTALLATION / IN FIELD

Before installation insure that all tubes are properly attached.

1. For in ground placement of the bucket, dig a hole atleast 12" wide and up to 6 ft deep depending on the depth of sample desired (often root level). Place bucket in ground so that it is level and both tubes are reaching up to the surface.
3. Sprinkle all of the filter sand media (supplied with unit) on top of the lid upon the mesh screen.
4. You may want to sieve dirt prior to replacement of soil. The soil that is shoveled onto the top of the sand that is on the lid of the bucket, should be fine to coarse (from lid to surface). This will allow pore water to move more naturally. Fill the hole so that the tubes are accessble and the bucket is covered (Fig. 4).
5. Upon irrigation or rain the sampler will capture the vertically percolated water. (Fig. 5).

COLLECTION OF SAMPLE (Fig. 6)

1. Use the Soilmoisture Model1900K3 Sample Extraction Kit (optional, Fig. 7) by attaching the sample access tube (with the green tie) to the collection flask, and the other to the Soilmoisture Model 2005G2 vacuum hand pump (optional, Fig. 8).
2. As you pull a vacuum, the sample that has been collected in the bucket will flow into the collection flask.

SOILMOISTURE EQUIPMENT CORP.
P.O. Box 30025, Santa Barbara, CA 93105 U.S.A.
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3



GENERAL CARE AND MAINTENANCE/TROUBLESHOOTING

- The Pan Lysimeter comes fully assembled, however, check all attachments to ensure that tubes are connected before installation.
- The Pan Lysimeter requires minimum maintenance after installation.
- Any kinks in any of the tubes will cause the unit to malfunction
- For the best results, the lysimeter should be checked and pumped on a regular basis.

REPLACEMENT PARTS /HELPFUL ITEMS

ITEM PART #	DESCRIPTION
MCM037	Filter Sand
MZT007	1/4" ID Poly Tubing
MZT013	3/8" ID 5/8" OD Tubing
1960-003CR	Soilmoisture Modified Bucket
1960-004CR	Soilmoisture Modified Lid
MWM015	MALE TO MALE CONNECTOR
1907	Seive Kit
HELPFUL ITEMS	
1900K3	Extraction Kit
2005G2	Vacuum Hand Pump



1900K3 Extraction Kit



2005G2 Vacuum Hand Pump

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P.O. Box 30025, Santa Barbara, CA 93105 U.S.A.
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4



**JULIET, KILO, AND TANGO RANGES
2012 ENVIRONMENTAL SAMPLING AND ANALYSIS
REPORT**

Sampling Conducted September and November 2012

1.0 INTRODUCTION

Juliet, Kilo, and Tango Ranges at Camp Edwards are 25-meter small arms ranges (SARs) currently used for marksmanship training using lead ammunition under a pilot period approved by the US Environmental Protection Agency (EPA) and the Environmental Management Commission (EMC). The pilot period is intended to assess the STAPP bullet containment systems installed on these three ranges and determine if the ranges can be used for live firing with lead ammunition while protecting the environment. The pilot period has been extended at all three ranges by EPA and EMC until the end of calendar year 2012. Figure 1 shows the locations of J, K, and T Ranges within Camp Edwards.

As part of the pilot period, and in accordance with the conditions established by the EMC and the EPA for the Massachusetts Army National Guard (MAARNG) to fire lead ammunition, these ranges are operated and maintained as outlined in range-specific Best Management Practices and Operations, Maintenance, and Monitoring Plans (OMMPs). The OMMPs were revised and combined into one document (the Best Management Practices and Operation, Maintenance and Monitoring Plan for Juliet, Kilo, and Tango Ranges at Camp Edwards, Massachusetts) which was completed in September 2012.

The OMMP includes a program of periodic sampling of soil, pore water, and groundwater. The samples are analyzed for select metals that are commonly used in ammunition. Soil samples and pore water samples are also analyzed for pH which is an important parameter for determining the mobility of certain metals in the environment. The goal of this monitoring program is to determine when routine maintenance activities are needed to promote range sustainability and protect the environment.

This report summarizes the environmental monitoring that was conducted by the MAARNG in 2012 as prescribed in the September 2012 version of the OMMP.

2.0 RANGE USE SUMMARY

J Range has been used as a SAR since the 1980s. Investigations of soil and groundwater were completed by the Impact Area Groundwater Study Program (IAGWSP) and the Final Juliet (J) Range Soil and Groundwater Investigation Report was completed in September 2008. Levels of nitroglycerine and lead that indicated deposition from range use were detected in soil. However, these analytes were not detected in groundwater. The MANG decided to remove

surface soils from the range and regrade it in 2008 and a STAPP bullet collection system was installed. The range floor was completely re-graded and reconstructed to improve drainage in 2010. Three pan lysimeters were installed on the range in 2010 to monitor pore water percolating through the soil. The pilot period commenced on J Range in 2009. Approximately 50,000 bullets were fired into the STAPP system on the range from 2009 to 2010. An additional 60,000 bullets (approximately) were fired in 2011. An additional 31,000 bullets were fired on the range in training year 2012. This report summarizes the fourth round of operational samples collected under the OMMP at J Range.

K Range has been used as a SAR since the 1980s. Investigations of soil and groundwater were completed by the IAGWSP and the Final Kilo (K) Range Soil and Groundwater Investigation Report was completed in September 2008. Levels of nitroglycerine and lead that indicated deposition from range use were detected in soil. However, these analytes were not detected in groundwater. The MANG regraded the range and installed a STAPP bullet collection system in 2008. The range floor was completely re-graded and reconstructed to improve drainage in 2010. Three pan lysimeters were installed on the range in 2010 to monitor pore water percolating through the soil. The pilot period commenced on K Range in 2009. Approximately 90,000 bullets were fired into the STAPP system on the range from 2009 to 2010. An additional 125,000 bullets (approximately) were fired in 2011. An additional 60,000 bullets were fired training year 2012. This report summarizes the fourth round of operational samples collected under the OMMP at K Range.

T Range has been used as a SAR since the 1980s. Investigations of soil and groundwater were completed by the IAGWSP and the Draft Final T Range Soil and Groundwater Investigation Report was completed by the IAGWSP in June 2007. Levels of nitroglycerine and lead were detected in soil that indicated deposition from range use. However, these analytes were not detected in groundwater. The MANG re-graded surface soils from the mounded firing line, in effect raising the 25-meter firing line and improving the angle of fire into the STAPP system. The area between the firing line and the new berm were not excavated or regraded. The STAPP bullet collection system was installed in 2006. Several suction lysimeters were installed in 2007 to monitor pore water percolating through the soil for tungsten. These were removed after sampling in 2010 because of concerns with the quality and representativeness of the samples. Three pan lysimeters were installed on the range in 2010. The pilot period commenced in 2008. Operational samples were first collected under the OMMP in 2008. Approximately 254,000 bullets were fired on the range from the commencement of the pilot test through 2010. An additional 37,000 bullets were fired in 2011. An additional 12,000 bullets were fired in training year 2012.

3.0 OMMP MONITORING REQUIREMENTS

3.1 Surface Soil

The soil sampling at J, K, and T Ranges includes semi-annual multi-increment sampling (MIS) from 0 to 3 inches depth from 6 sample areas on each range (see Attachment 1, Figures 1, 2, and 3). The sample areas are laid out in strips across the width of the ranges from the firing lines to the backstop berms so that the impact of deposition at the firing lines, the target areas, and the areas in between could be separately quantified.

Soil samples were collected from J range in September 2012. K and T Ranges will be sampled in 2013.

One hundred point composite samples were collected from a depth of 0 to 3 inches below ground surface (bgs). Two replicate 100-point samples were also collected from Area 1. All samples were submitted to Test America Laboratory, Inc. in Burlington, Vermont for analysis. All samples were ground and processed in accordance with Method 8330B. Soil samples were analyzed by method 6010C for antimony, copper, and lead. Soil sampling locations are shown on Figure 2 and analytical results are summarized in Table 1.

3.2 Pore Water

Pore water samples were collected from the pan lysimeters installed on J, K, and T Ranges in September 2012. All pan lysimeters are installed approximately 2 feet below the ground surface. One half of the sample volume was field filtered and both unfiltered and filtered samples were submitted for analysis. All pore water samples were analyzed by method 6020A for antimony, copper, and lead. The locations of the lysimeters are shown on Figures 3, 4, and 5 and analytical results are summarized in Table 2.

During the September 2012 sampling round, pH readings were taken from the lysimeters. Measuring the pH of the pore water provides some indication of the effectiveness of the lime additions on the range floor. The pH readings ranged from 5.7 to 6.7 as summarized in the table below. The 2011 readings are included for comparison as are the pH values recorded during the November 2012 re-sampling of lysimeters with action level exceedences.

LOCID	Sample_ID	Analyte	Nov 2012 Reading	Sept 2012 Reading	Oct 2011 Reading
LYJRNG001	LYJRNG001_OCT11UA	pH	NS	6.7	8.6
LYJRNG002	LYJRNG002_OCT11UA	pH	NS	6.5	7.6
LYJRNG003	LYJRNG003_OCT11UA	pH	8.65	6.6	8.0
LYKRNG001	LYKRNG001_OCT11UA	pH	NS	6.4	No water
LYKRNG002	LYKRNG002_OCT11UA	pH	NS	5.7	7.6

LYKRNG003	LYKRNG003_OCT11UA	pH	5.66	6.4	9.0
LYKRNG004	LYKRNG004_OCT11UA	pH	6.66	6.3	No water
LYTRNG011	LYTR011_OCT11UA	pH	NS	6.0	7.0
LYTRNG012	LYTR012_OCT11UA	pH	NS	5.6	No water
LYTRNG013	LYTR013_OCT11UA	pH	NS	6.3	8.1

NS= not sampled.

The ideal pH range for control of lead has been determined to be 6 to 8.5. Due to this data and the soil pH data lime was spread on these ranges in April/May and on November 7 2012 to raise the pH.

Due to unexpected detections of antimony in several lysimeters, pore water from those lysimeters was resampled and analyzed for antimony in November 2012. Duplicate samples were also collected from each lysimeter. Analytical results are summarized in Table 3.

3.3 Groundwater

Groundwater monitoring well locations are shown on Figures 3, 4, and 5. Groundwater samples were collected from all five wells in the monitoring program in September 2012. Only unfiltered (total metals) samples were collected during this sampling round. Samples were analyzed by method 6020A for antimony, copper, and lead. Results are summarized in Table 4.

3.4 STAPP System Water

Sampling of the water in the STAPP systems was not needed in 2012.

4.0 COMPARISON TO OMMP INTERIM ACTION LEVELS

The September 2012 version of the combined J, K, and T Ranges OMMP lists action levels for soil, pore water, and groundwater concentrations that trigger response actions. Action levels have been assigned for antimony, copper, and lead. The action levels are summarized on Figure 6.

4.1 Soil

No action levels were exceeded where soil samples were collected at J Range.

4.2 Pore Water

The action level for antimony in pore water (6 ppb) was exceeded in lysimeter LYJRNG003 at J Range and LYKRNG003 and LYKRNG004 at K Range. All of these lysimeters are located in or near the drainage swales on these ranges.

As per the OMMP, these lysimeters were resampled in duplicate on November 11 and the samples were submitted for antimony analysis by method 6020. Results of the resampling indicate continued exceedences of the action levels in

these lysimeters. Further investigation of the cause of these elevated antimony concentrations is currently ongoing.

No action levels were exceeded in the pore water at T Range.

4.3 Groundwater

No action levels were exceeded in the groundwater monitoring wells at J Range.

No action levels were exceeded in the groundwater monitoring wells at K Range.

No action levels were exceeded in the groundwater monitoring wells at T Range.

5.0 COMPARISON WITH PREVIOUS SAMPLING RESULTS

5.1 Soil

Soil sampling on J Range started in October 2010. That was the first sample collection since reconstruction of the range including complete replacement of the range floor. Additional samples were collected in May 2011 and October 2011 using the same protocols.

Lead concentrations at J range have remained steady over the three sample rounds conducted with no clear pattern. Average lead concentrations, using all 12 soil samples collected, have been 44 ppm, 53 ppm, 50 ppm and, most recently, 34 ppm.

Average lead concentrations, ppm				
	Oct-10	May-11	Oct-11	Sept-12
J Range	44	53	50	34
K Range	24	23	27	Not Sampled
T Range	212	165	207	Not Sampled

5.2 Pore Water

The pore water lysimeters at J, K, and T Ranges have been sampled four times under the OMMPs: October 2010, May 2011, October 2011, and September 2012. In addition, samples were collected from the three lysimeters with antimony concentrations exceeding the action level (6 ppb) in November 2012. Method 6010 was used to analyze for metals during the first monitoring event, the more sensitive method 6020 has been used since May 2011.

The increased sensitivity leads to more frequently quantified values as the detection limit nears the natural background concentrations. The background concentrations of antimony, copper, and lead in pore water at MMR are not yet known because a study of background concentrations has not been completed. However, note that the analysis in two rounds of background pore water monitoring at T Range indicate antimony concentrations as high as 1.5 ppb, copper at 1.6 ppb, and lead at 0.082 ppb. Detected concentrations of these metals near these values in lysimeters on the ranges may tentatively be expected to be background concentrations. A more complete report of background pore water concentrations at the Small Arms Ranges is expected to be complete in 2013.

Antimony was detected at significant concentrations for the first time during the September 2012 monitoring.

Cooper, lead, and antimony have all been detected in various lysimeters during pore water sampling events since the first pan lysimeter samples were collected in 2010. However, the detections are often not repeated in subsequent events and no trends seem to be apparent. For example, in May 2011, the highest lead concentration in pore water to date was detected at 9 ppb in lysimeter LYJRNG003 on J Range. No lead was detected in this lysimeter in October 2011 and only a low concentration barely above the detection limit was detected in September 2012. The variability of metals detections in pore water cannot yet be explained.

5.3 Groundwater

The groundwater wells at J, K, and T Ranges have been sampled four times under the OMMPs: October 2010, May 2011, October 2011, and September 2012. Method 6010 was used to analyze for metals during the first monitoring event, the more sensitive Method 6020 has been used since May 2011. As with the pore water sampling, the reduced detection limits have lead to more quantifiable detections of low concentrations of metals. These could be representative of background conditions, but a study of background metals concentrations in groundwater near the SARs has not been attempted. No trends are apparent in the data.

6.0 REPEATABILITY OF REPLICATE SOIL SAMPLES

Repeatability of a sampling program is assessed through the collection and analysis of replicate samples from the same sample area. The Relative Standard Deviation (RSD) of the replicates is calculated and compared to a quality goal. The RSD= the standard deviation of the three replicate results divided by the average of the three results expressed as a percentage. In Appendix C attached to EPA's May 3 2011 letter, EPA indicates a preference for RSDs of 25% or less for sampling at J, K, and T Ranges.

Replicate samples were collected from Area 1 at J Range during 2012. The RSD of those three samples for lead was 22% and for copper the RSD was 7% so the repeatability was acceptable. Concentrations of antimony were not detected in the three replicate samples from Area 1.

7.0 FURTHER ACTION

Comparison of the detected soil and groundwater concentrations to the action levels in the OMMP indicate that no range maintenance actions are needed at this time.

Elevated detections of antimony in three of the lysimeters required resampling to determine if the original result is representative of actual site conditions. Results confirmed the presence of antimony at levels exceeding the action level. Further sampling to determine potential causes of the antimony in the pore water will be proposed. Appropriate responses to the findings will be discussed with the regulatory agencies and Camp Edwards staff to determine an appropriate course of action. Decisions and findings will be documented via a project note or similar format.

The OMMP currently specifies method 6010 for aqueous metals analyses, however, the reporting levels using this method are higher than the action levels specified in the OMMP. Method 6020 uses the same basic techniques and methods but achieves lower reporting limits and minimum detection limits. The OMMP will be changed to specify that aqueous metals analyses will be conducted using method 6020.

Soil, pore water, and groundwater samples will be collected again in the fall of 2013.

FIGURES

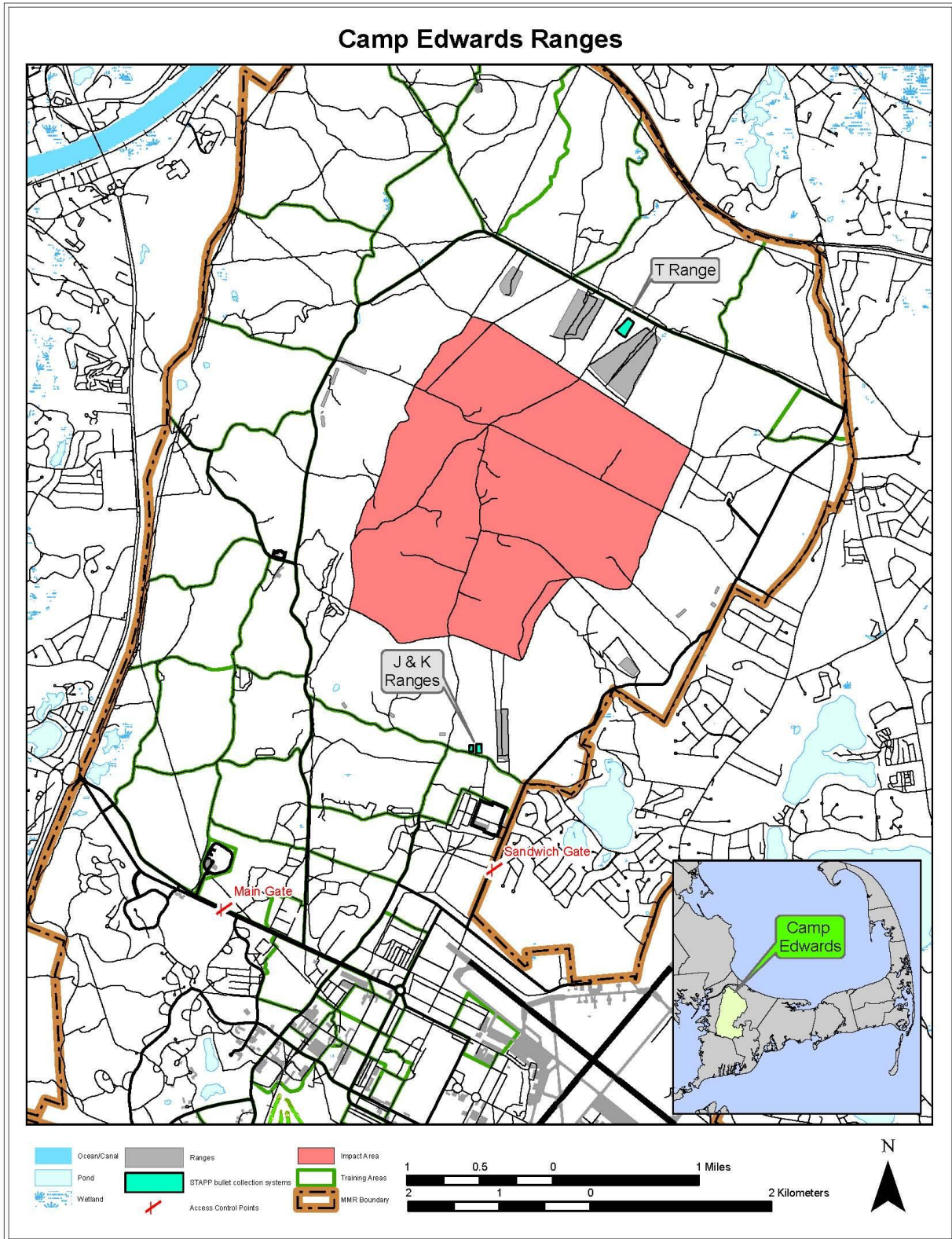


Figure 2 - J Range Soil Lead Results



Figure 3 - J Range Pore Water Results



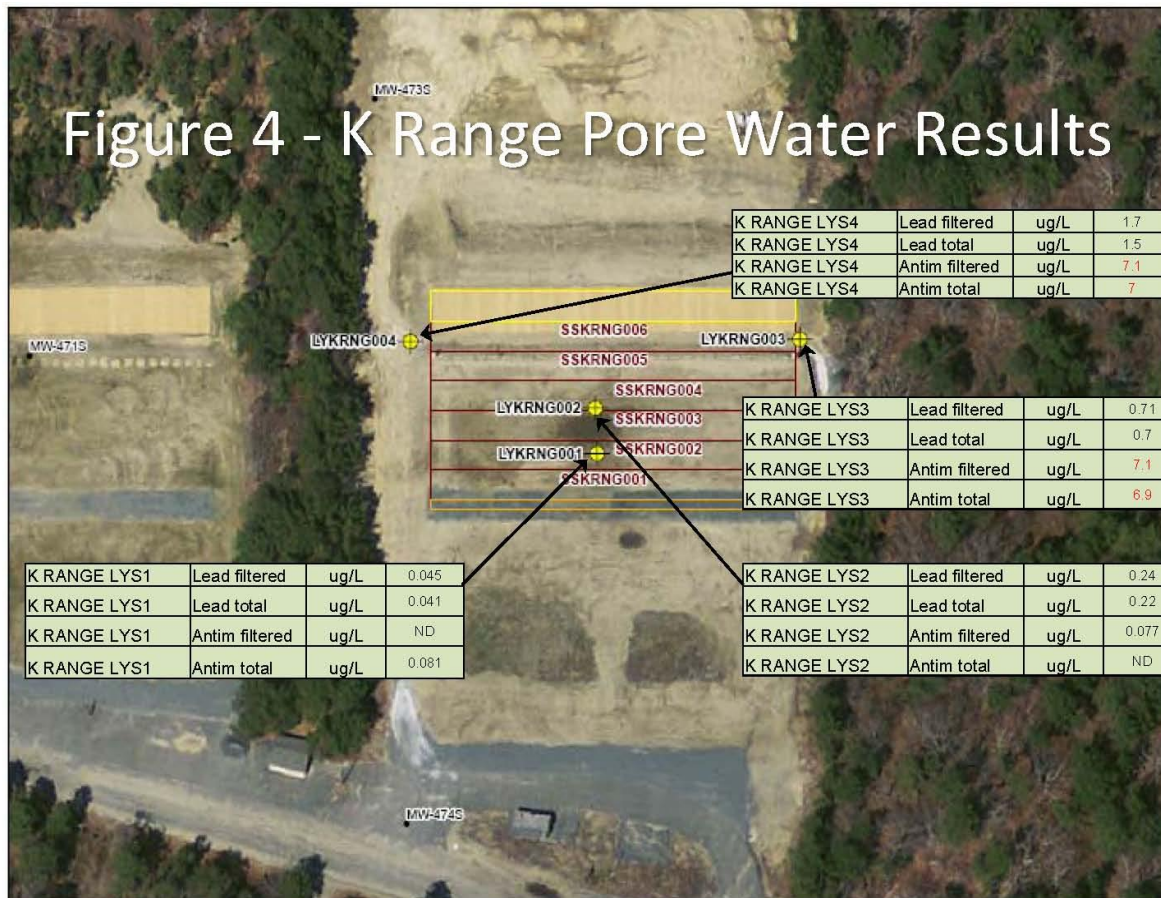


Figure 5 - T Range Pore Water Results

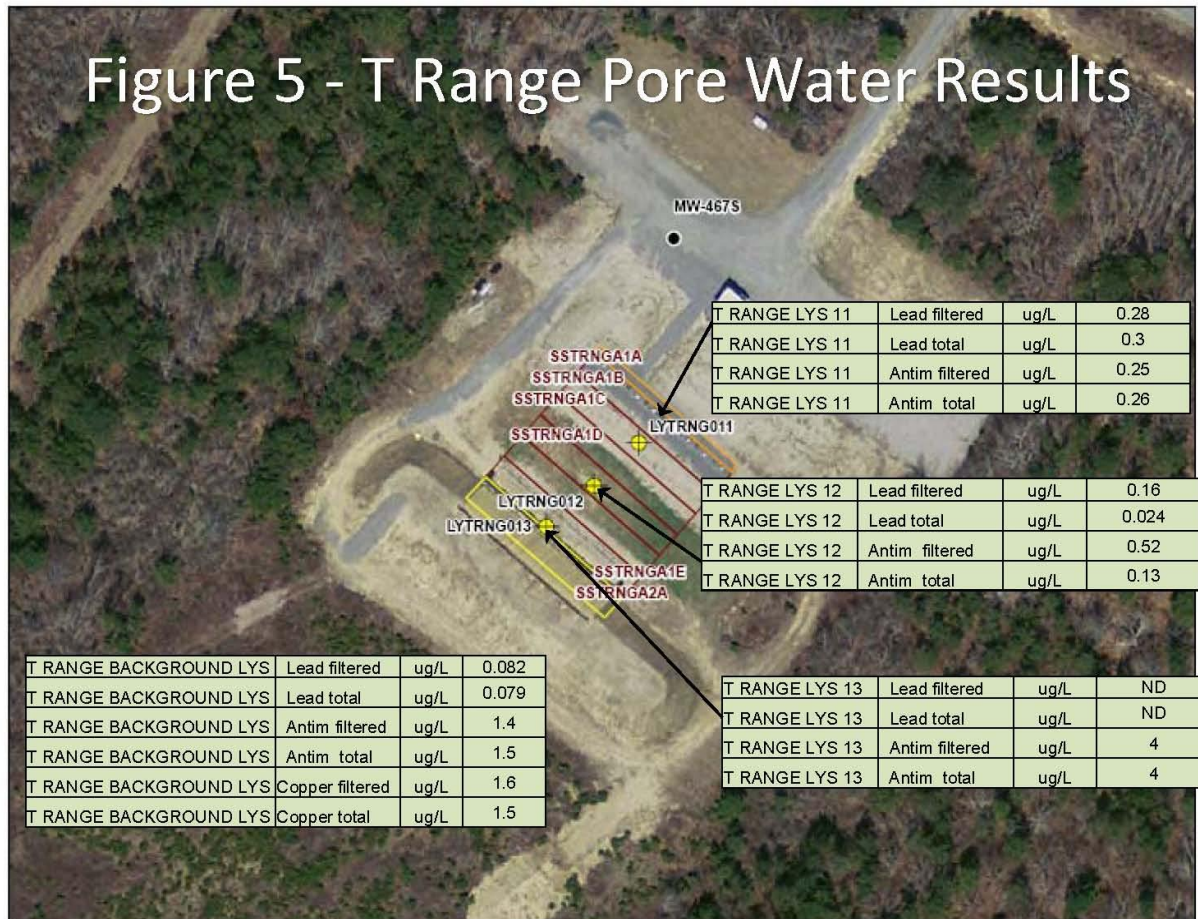


Figure 6 OMMP Action Levels

Table 11-1. Surface Soil Action Levels

Analyte	
Lead	3,000 mg/Kg
Antimony	300 mg/Kg
Copper	10,000 mg/Kg

mg/kg= milligrams per kilograms or ppm

Table 11-2. Pore Water Action Levels

Analyte	
Lead	15 ug/L
Antimony	6 ug/L
Copper	1300 ug/L

ug/L= micrograms per liter or ppb

Table 11-3. Groundwater Action Levels

Analyte	
Lead	7.5 ug/L
Antimony	3 ug/L
Copper	650 ug/L

ug/L= micrograms per liter or ppb

TABLE 1
Small Arms Ranges Soil Sample Results
Fall 2012 Sampling Event

Site/SLX List	Location ID	Field Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Analyte	Result Value	Qualifier	Units	MDL	RL	Sample Type
J RANGE	SSJ RNG001	SSJ RNG001_SEP12A	0	0.25	09/12/2012	SW6010C	Antimony	ND	UJ	MG/KG	0.15	1.8	N1
J RANGE	SSJ RNG001	SSJ RNG001_SEP12A	0	0.25	09/12/2012	SW6010C	Copper	17.6	J	MG/KG	0.067	0.76	N1
J RANGE	SSJ RNG001	SSJ RNG001_SEP12A	0	0.25	09/12/2012	SW6010C	Lead	18.7		MG/KG	0.13	0.30	N1
J RANGE	SSJ RNG001	SSJ RNG001_SEP12B	0	0.25	09/12/2012	SW6010C	Antimony	ND	U	MG/KG	0.13	1.6	FR1
J RANGE	SSJ RNG001	SSJ RNG001_SEP12B	0	0.25	09/12/2012	SW6010C	Copper	14.90		MG/KG	0.059	0.67	FR1
J RANGE	SSJ RNG001	SSJ RNG001_SEP12B	0	0.25	09/12/2012	SW6010C	Lead	21		MG/KG	0.12	0.27	FR1
J RANGE	SSJ RNG001	SSJ RNG001_SEP12C	0	0.25	09/12/2012	SW6010C	Antimony	ND	U	MG/KG	0.14	1.7	FR2
J RANGE	SSJ RNG001	SSJ RNG001_SEP12C	0	0.25	09/12/2012	SW6010C	Copper	17		MG/KG	0.063	0.71	FR2
J RANGE	SSJ RNG001	SSJ RNG001_SEP12C	0	0.25	09/12/2012	SW6010C	Lead	30.7		MG/KG	0.13	0.28	FR2
J RANGE	SSJ RNG002	SSJ RNG002_SEP12A	0	0.25	09/12/2012	SW6010C	Antimony	ND	U	MG/KG	0.15	1.8	N1
J RANGE	SSJ RNG002	SSJ RNG002_SEP12A	0	0.25	09/12/2012	SW6010C	Copper	8		MG/KG	0.066	0.75	N1
J RANGE	SSJ RNG002	SSJ RNG002_SEP12A	0	0.25	09/12/2012	SW6010C	Lead	43		MG/KG	0.13	0.30	N1
J RANGE	SSJ RNG003	SSJ RNG003_SEP12A	0	0.25	09/12/2012	SW6010C	Antimony	ND	U	MG/KG	0.20	2.5	N1
J RANGE	SSJ RNG003	SSJ RNG003_SEP12A	0	0.25	09/12/2012	SW6010C	Copper	6.6		MG/KG	0.091	1.0	N1
J RANGE	SSJ RNG003	SSJ RNG003_SEP12A	0	0.25	09/12/2012	SW6010C	Lead	43.3		MG/KG	0.18	0.41	N1
J RANGE	SSJ RNG004	SSJ RNG004_SEP12A	0	0.25	09/12/2012	SW6010C	Antimony	ND	U	MG/KG	0.093	1.1	N1
J RANGE	SSJ RNG004	SSJ RNG004_SEP12A	0	0.25	09/12/2012	SW6010C	Copper	5.5		MG/KG	0.042	0.47	N1
J RANGE	SSJ RNG004	SSJ RNG004_SEP12A	0	0.25	09/12/2012	SW6010C	Lead	30.8		MG/KG	0.083	0.19	N1
J RANGE	SSJ RNG005	SSJ RNG005_SEP12A	0	0.25	09/12/2012	SW6010C	Antimony	0.091	J	MG/KG	0.076	0.92	N1
J RANGE	SSJ RNG005	SSJ RNG005_SEP12A	0	0.25	09/12/2012	SW6010C	Copper	5		MG/KG	0.034	0.39	N1
J RANGE	SSJ RNG005	SSJ RNG005_SEP12A	0	0.25	09/12/2012	SW6010C	Lead	36.5		MG/KG	0.068	0.15	N1
J RANGE	SSJ RNG006	SSJ RNG006_SEP12A	0	0.25	09/12/2012	SW6010C	Antimony	ND	U	MG/KG	0.13	1.6	N1
J RANGE	SSJ RNG006	SSJ RNG006_SEP12A	0	0.25	09/12/2012	SW6010C	Copper	8.1		MG/KG	0.059	0.68	N1
J RANGE	SSJ RNG006	SSJ RNG006_SEP12A	0	0.25	09/12/2012	SW6010C	Lead	27.9		MG/KG	0.12	0.27	N1

ND/U = Non detect
J = Estimated Result
mg/kg = milligram/kilogram

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MDL = Method Detectin Limit
RL = Reporting Limit
N = Native Sample
FR = Field Replicate Sample

TABLE 2
Small Arms Range Lysimeter Sample Results
Fall 2012 Sampling Event

Site/SLX List	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier	Units	MDL	RL
J RANGE	LYJRNG001	LYJRNG001_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	0.56	J	UG/L	0.073	20.0
J RANGE	LYJRNG001	LYJRNG001_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	1.2	J	UG/L	0.23	20.0
J RANGE	LYJRNG001	LYJRNG001_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	0.11	J	UG/L	0.024	2.0
J RANGE	LYJRNG001	LYJRNG001_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	0.56	J	UG/L	0.073	20.0
J RANGE	LYJRNG001	LYJRNG001_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	1.3	J	UG/L	0.23	20.0
J RANGE	LYJRNG001	LYJRNG001_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	0.56	J	UG/L	0.024	2.0
J RANGE	LYJRNG002	LYJRNG002_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	0.36	J	UG/L	0.073	20.0
J RANGE	LYJRNG002	LYJRNG002_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	0.87	J	UG/L	0.23	20.0
J RANGE	LYJRNG002	LYJRNG002_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	0.063	J	UG/L	0.024	2.0
J RANGE	LYJRNG002	LYJRNG002_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	0.37	J	UG/L	0.073	20.0
J RANGE	LYJRNG002	LYJRNG002_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	0.98	J	UG/L	0.23	20.0
J RANGE	LYJRNG002	LYJRNG002_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	0.58	J	UG/L	0.024	2.0
J RANGE	LYJRNG003	LYJRNG003_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	11.4	J	UG/L	0.073	20.0
J RANGE	LYJRNG003	LYJRNG003_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	1.3	J	UG/L	0.23	20.0
J RANGE	LYJRNG003	LYJRNG003_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	0.093	J	UG/L	0.024	2.0
J RANGE	LYJRNG003	LYJRNG003_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	11.4	J	UG/L	0.073	20.0
J RANGE	LYJRNG003	LYJRNG003_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	1.3	J	UG/L	0.23	20.0
J RANGE	LYJRNG003	LYJRNG003_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	0.24	J	UG/L	0.024	2.0
K RANGE	LYKRNG001	LYKRNG001_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRNG001	LYKRNG001_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	0.52	J	UG/L	0.23	20.0
K RANGE	LYKRNG001	LYKRNG001_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	0.045	J	UG/L	0.024	2.0
K RANGE	LYKRNG001	LYKRNG001_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	0.081	J	UG/L	0.073	20.0
K RANGE	LYKRNG001	LYKRNG001_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	ND	U	UG/L	0.23	20.0
K RANGE	LYKRNG001	LYKRNG001_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	0.041	J	UG/L	0.024	2.0
K RANGE	LYKRNG002	LYKRNG002_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	0.077	J	UG/L	0.073	20.0
K RANGE	LYKRNG002	LYKRNG002_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	0.34	J	UG/L	0.23	20.0
K RANGE	LYKRNG002	LYKRNG002_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	0.24	J	UG/L	0.024	2.0
K RANGE	LYKRNG002	LYKRNG002_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	LYKRNG002	LYKRNG002_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	ND	U	UG/L	0.23	20.0
K RANGE	LYKRNG002	LYKRNG002_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	0.22	J	UG/L	0.024	2.0
K RANGE	LYKRNG003	LYKRNG003_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	7.1	J	UG/L	0.073	20.0
K RANGE	LYKRNG003	LYKRNG003_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	0.59	J	UG/L	0.23	20.0
K RANGE	LYKRNG003	LYKRNG003_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	0.71	J	UG/L	0.024	2.0
K RANGE	LYKRNG003	LYKRNG003_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	6.9	J	UG/L	0.073	20.0
K RANGE	LYKRNG003	LYKRNG003_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	0.4	J	UG/L	0.23	20.0
K RANGE	LYKRNG003	LYKRNG003_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	0.7	J	UG/L	0.024	2.0
K RANGE	LYKRNG004	LYKRNG004_SEP12FA	09/11/2012	SW6020A	FLDFLT	Antimony	7	J	UG/L	0.073	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12FA	09/11/2012	SW6020A	FLDFLT	Copper	2.3	J	UG/L	0.23	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12FA	09/11/2012	SW6020A	FLDFLT	Lead	1.4	J	UG/L	0.024	2.0
K RANGE	LYKRNG004	LYKRNG004_SEP12FD	09/11/2012	SW6020A	FLDFLT	Antimony	7.1	J	UG/L	0.073	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12FD	09/11/2012	SW6020A	FLDFLT	Copper	2.5	J	UG/L	0.23	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12FD	09/11/2012	SW6020A	FLDFLT	Lead	1.5	J	UG/L	0.024	2.0
K RANGE	LYKRNG004	LYKRNG004_SEP12UA	09/11/2012	SW6020A	TOTAL	Antimony	7	J	UG/L	0.073	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12UA	09/11/2012	SW6020A	TOTAL	Copper	2.3	J	UG/L	0.23	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12UA	09/11/2012	SW6020A	TOTAL	Lead	1.7	J	UG/L	0.024	2.0
K RANGE	LYKRNG004	LYKRNG004_SEP12UD	09/11/2012	SW6020A	TOTAL	Antimony	6.6	J	UG/L	0.073	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12UD	09/11/2012	SW6020A	TOTAL	Copper	2.2	J	UG/L	0.23	20.0
K RANGE	LYKRNG004	LYKRNG004_SEP12UD	09/11/2012	SW6020A	TOTAL	Lead	1.5	J	UG/L	0.024	2.0
K RANGE	LYKRBGD01		09/11/2012			DRY - No Sample					

J = Estimated Result
ND/U = Non detect

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ug/l = microgram/liter
MDL = Method Detection Limit
RL = Reporting Limit

TABLE 2
Small Arms Range Lysimeter Sample Results
Fall 2012 Sampling Event

Site/SLX List	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier	Units	MDL	RL
T RANGE	LYTRBGD01	LYTRBK01_SEP12FA	09/13/2012	SW6020A	FLDFLT	Antimony	1.4	J	UG/L	0.073	20.0
T RANGE	LYTRBGD01	LYTRBK01_SEP12FA	09/13/2012	SW6020A	FLDFLT	Copper	1.6	J	UG/L	0.23	20.0
T RANGE	LYTRBGD01	LYTRBK01_SEP12FA	09/13/2012	SW6020A	FLDFLT	Lead	0.082	J	UG/L	0.024	2.0
T RANGE	LYTRBGD01	LYTRBK01_SEP12UA	09/13/2012	SW6020A	TOTAL	Antimony	1.5	J	UG/L	0.073	20.0
T RANGE	LYTRBGD01	LYTRBK01_SEP12UA	09/13/2012	SW6020A	TOTAL	Copper	1.5	J	UG/L	0.23	20.0
T RANGE	LYTRBGD01	LYTRBK01_SEP12UA	09/13/2012	SW6020A	TOTAL	Lead	0.079	J	UG/L	0.024	2.0
T RANGE	LYTRNG011	LYTRNG011_SEP12FA	09/13/2012	SW6020A	FLDFLT	Antimony	0.25	J	UG/L	0.073	20.0
T RANGE	LYTRNG011	LYTRNG011_SEP12FA	09/13/2012	SW6020A	FLDFLT	Copper	1.3	J	UG/L	0.23	20.0
T RANGE	LYTRNG011	LYTRNG011_SEP12FA	09/13/2012	SW6020A	FLDFLT	Lead	0.28	J	UG/L	0.024	2.0
T RANGE	LYTRNG011	LYTRNG011_SEP12UA	09/13/2012	SW6020A	TOTAL	Antimony	0.26	J	UG/L	0.073	20.0
T RANGE	LYTRNG011	LYTRNG011_SEP12UA	09/13/2012	SW6020A	TOTAL	Copper	1.2	J	UG/L	0.23	20.0
T RANGE	LYTRNG011	LYTRNG011_SEP12UA	09/13/2012	SW6020A	TOTAL	Lead	0.3	J	UG/L	0.024	2.0
T RANGE	LYTRNG012	LYTRNG012_SEP12FA	09/13/2012	SW6020A	FLDFLT	Antimony	0.52	J	UG/L	0.073	20.0
T RANGE	LYTRNG012	LYTRNG012_SEP12FA	09/13/2012	SW6020A	FLDFLT	Copper	3.4	J	UG/L	0.23	20.0
T RANGE	LYTRNG012	LYTRNG012_SEP12FA	09/13/2012	SW6020A	FLDFLT	Lead	0.16	J	UG/L	0.024	2.0
T RANGE	LYTRNG012	LYTRNG012_SEP12UA	09/13/2012	SW6020A	TOTAL	Antimony	0.13	J	UG/L	0.073	20.0
T RANGE	LYTRNG012	LYTRNG012_SEP12UA	09/13/2012	SW6020A	TOTAL	Copper	0.73	J	UG/L	0.23	20.0
T RANGE	LYTRNG012	LYTRNG012_SEP12UA	09/13/2012	SW6020A	TOTAL	Lead	0.024	J	UG/L	0.024	2.0
T RANGE	LYTRNG013	LYTRNG013_SEP12FA	09/13/2012	SW6020A	FLDFLT	Antimony	4	J	UG/L	0.073	20.0
T RANGE	LYTRNG013	LYTRNG013_SEP12FA	09/13/2012	SW6020A	FLDFLT	Copper	2.8	J	UG/L	0.23	20.0
T RANGE	LYTRNG013	LYTRNG013_SEP12FA	09/13/2012	SW6020A	FLDFLT	Lead	ND	U	UG/L	0.024	2.0
T RANGE	LYTRNG013	LYTRNG013_SEP12UA	09/13/2012	SW6020A	TOTAL	Antimony	4	J	UG/L	0.073	20.0
T RANGE	LYTRNG013	LYTRNG013_SEP12UA	09/13/2012	SW6020A	TOTAL	Copper	2.7	J	UG/L	0.23	20.0
T RANGE	LYTRNG013	LYTRNG013_SEP12UA	09/13/2012	SW6020A	TOTAL	Lead	ND	U	UG/L	0.024	2.0

J = Estimated Result
 ND/U = Non detect

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ug/l = microgram/liter
 MDL = Method Detection Limit
 RL = Reporting Limit

Table 3
Lysimeter Resampling Results
November 2012

Site/SLX List	Location ID	Field Sample ID	Date Sampled	Test Method	Extraction Method	Analyte	Result Value	Qualifier	Units	MDL	RL	Sample Type
J RANGE	LYJ RNG003	LYJ RNG003_NOV12UA	11/01/2012	SW6020A	TOTAL	Antimony	32.8		UG/L	0.073	20.0	N1
J RANGE	LYJ RNG003	LYJ RNG003_NOV12UD	11/01/2012	SW6020A	TOTAL	Antimony	32.3		UG/L	0.073	20.0	FD1
K RANGE	LYK RNG003	LYK RNG003_NOV12UA	11/01/2012	SW6020A	TOTAL	Antimony	9.5	J	UG/L	0.073	20.0	N1
K RANGE	LYK RNG003	LYK RNG003_NOV12UD	11/01/2012	SW6020A	TOTAL	Antimony	9.6	J	UG/L	0.073	20.0	FD1
K RANGE	LYK RNG004	LYK RNG004_NOV12UA	11/01/2012	SW6020A	TOTAL	Antimony	11.9	J	UG/L	0.073	20.0	N1
K RANGE	LYK RNG004	LYK RNG004_NOV12UD	11/01/2012	SW6020A	TOTAL	Antimony	12.1	J	UG/L	0.073	20.0	FD1

UG/L= Microgram per liter

TABLE 4
Small Arms Range Groundwater Sample Results
Fall 2012 Sampling Event

Site/SLX List	Location ID	Field Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Date Sampled	Test Method	Analyte	Result Value	Qualifier	Units	MDL	RL
J RANGE	MW-471S	MW-471S_SEP12UA	84.59	94.59	09/20/2012	SW6020A	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	MW-471S	MW-471S_SEP12UA	84.59	94.59	09/20/2012	SW6020A	Copper	0.30	J	UG/L	0.23	20.0
J RANGE	MW-471S	MW-471S_SEP12UA	84.59	94.59	09/20/2012	SW6020A	Lead	ND	U	UG/L	0.024	2.0
J RANGE	MW-472S	MW-472S_SEP12UA	85.31	95.31	09/17/2012	SW6020A	Antimony	ND	U	UG/L	0.073	20.0
J RANGE	MW-472S	MW-472S_SEP12UA	85.31	95.31	09/17/2012	SW6020A	Copper	1.4	J	UG/L	0.23	20.0
J RANGE	MW-472S	MW-472S_SEP12UA	85.31	95.31	09/17/2012	SW6020A	Lead	ND	U	UG/L	0.024	2.0
K RANGE	MW-473S	MW-473S_SEP12UA	83.38	93.38	09/26/2012	SW6020A	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-473S	MW-473S_SEP12UA	83.38	93.38	09/26/2012	SW6020A	Copper	1.2	J	UG/L	0.23	20.0
K RANGE	MW-473S	MW-473S_SEP12UA	83.38	93.38	09/26/2012	SW6020A	Lead	0.18	J	UG/L	0.024	2.0
K RANGE	MW-474S	MW-474S_SEP12UA	86.44	96.44	09/26/2012	SW6020A	Antimony	ND	U	UG/L	0.073	20.0
K RANGE	MW-474S	MW-474S_SEP12UA	86.44	96.44	09/26/2012	SW6020A	Copper	0.82	J	UG/L	0.23	20.0
K RANGE	MW-474S	MW-474S_SEP12UA	86.44	96.44	09/26/2012	SW6020A	Lead	0.042	J	UG/L	0.024	2.0
T RANGE	MW-467S	MW-467S_SEP12UA	124.94	134.94	09/20/2012	SW6020A	Antimony	ND	U	UG/L	0.073	20.0
T RANGE	MW-467S	MW-467S_SEP12UA	124.94	134.94	09/20/2012	SW6020A	Copper	0.26	J	UG/L	0.23	20.0
T RANGE	MW-467S	MW-467S_SEP12UA	124.94	134.94	09/20/2012	SW6020A	Lead	0.097	J	UG/L	0.024	2.0

ug/L = microgram/liter

**APPENDIX D:
EOEEA CERTIFICATE
SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT**



The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
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September 29, 2012

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
 ON THE
 SUPPLEMENTAL FINAL ENVIRONMENTAL IMPACT REPORT

PROJECT NAME : Final Area-Wide Environmental Impact Report for
 Massachusetts National Guard Properties at the
 Massachusetts Military Reservation (MMR) – Small Arms
 Ranges Improvement Project (SAR-IP)
 PROJECT MUNICIPALITY : Bourne, Falmouth, Mashpee, Sandwich
 PROJECT WATERSHED : Cape Cod
 EOE NUMBER : 5834
 PROJECT PROPONENT : The Massachusetts National Guard
 DATE NOTICED IN MONITOR : September 26, 2006

Pursuant to the Massachusetts Environmental Policy Act (G.L. c. 30, ss. 61-62H) and Section 11.10 of the MEPA regulations (301 CMR 11.00), I have reviewed the Supplemental Final Environmental Impact Report (Supplemental EIR) submitted by the Massachusetts National Guard (MANG) on this project and have determined that it adequately responds to the Scope of the MEPA Certificate on the Notice of Project Change (NPC) dated November 9, 2006.

I acknowledge the significant amount of work that the MANG has undertaken since the Final EIR review in 2001 to promote environmental protection at MMR. This work has included extensive technical analysis and public review in collaboration with the Environmental Management Commission (EMC) and its Advisory Councils. Based on my review of the information provided by the MANG in the Supplemental EIR, the comment letters received, and consultations with the EMC and other state and federal agencies, I find that it is appropriate to allow details of range-specific pollution prevention (P2) plans to be finalized in the future through existing mechanisms. These mechanisms include the Small Arms Range (SAR) Working Group, EMC's Science Advisory Council (SAC) and Community Advisory Council (CAC), and the EMC and U.S. Environmental Protection Agency (EPA) approval process. I continue to reserve the right to require future filings as necessary pursuant to the provisions of the MEPA

regulations and the Special Review Procedure (SRP). I am also requiring the MANG to provide the MEPA Office with copies of P2 plans when they are finalized together and to provide detailed updates on Small Arms Range Improvements Project (SAR-IP) activities as part of the Annual State of the Reservation Reports.

MEPA REVIEW

The Massachusetts Military Reservation (MMR) Master plan was designated as a “major and complicated” project and a Special Review Procedure was established as further detailed in the Certificate on the Notice of Project Change and the Major and Complicated Procedure (issued July 10, 1997). A Certificate on the Draft Area-Wide EIR was issued on October 22, 1999 and a Certificate on the Final Area-Wide EIR for the MMR Master Plan was issued on July 16, 2001. As part of the MMR Master Plan, the Camp Edwards Training Area (referred to as the northern 15,000 acres in the Final EIR) was set aside for permanent protection of water supplies, wildlife habitat, and open space, while allowing compatible military training. The Final EIR proposed a set of Environmental Performance Standards (EPS) that included a prohibition on the use of lead-bullet ammunition at all Camp Edwards training areas. The Certificate on the Final EIR required MEPA review for future projects within the Camp Edwards Training Area that exceed certain thresholds, including “lowered thresholds” for activities involving any new impervious area, vegetative clearing or other land alteration (as detailed in the Informational Supplement to the FEIR, dated August 15, 2001).

On February 15, 2006, the MANG submitted a Notice of Project Change (NPC) to the MEPA Office proposing upgrades at Bravo, Echo and Sierra ranges (B, E, S Ranges). A Secretary’s Certificate on the NPC for was issued on March 24, 2006. On September 15, 2006, the MANG submitted a second NPC (2nd NPC) to the MEPA Office that described a Small Arms Ranges Improvement Project (SAR-IP) designed to resume small arms weapons training at Camp Edwards using lead-bullet ammunition in a manner that protects human health and the environment. The 2nd NPC proposed modifying one of the EPSs in order to allow lead-bullet use that did not require the preparation of an Environmental Impact Report.

The Small Arms Range (SAR) Pollution Prevention (P2) Plan proposed the use of best management practices (BMPs) to manage lead and protect groundwater resources. The MANG requested approval from EMC and the EPA to focus initially on the Phase I ranges identified as Tango (T) and Echo (E) Ranges. The NPC proposed use of a bullet catcher system (known as the STAPP system) for T Range as well as installation of one monitoring well and several lysimeters to measure groundwater and soil pore-water quality. The 2nd NPC proposed BMPs for the E Range including an 18-inch layer of sand on the range floor, a horizontal berm to contain lead, periodic sifting to remove lead slugs, and a monitoring well and lysimeters. The 2nd NPC identified a number of generally applicable operational, administrative and design BMPs that may be used for training areas depending on range-specific conditions. These included earthen berms of varying design, the STAPP bullet trap system, adjustment of soil pH, metals monitoring and sampling, and periodic removal of metals from berms and soils. Potential BMPs also included range grading and use of vegetation and windbreaks to manage stormwater flows and minimize erosion. P2 plans and BMPs were presented in the 2nd NPC at a conceptual level of detail.

The MANG proposed to resume use of lead-bullet ammunition in a three-phased approach beginning in April 2007. Phase I included the Tango and Echo ranges (T and E). Phase II included the SE/SW Range, Alpha, Juliet and Kilo Ranges (A, J and K Ranges). Phase III included the KD and ISBC Ranges, and other ranges as training needs are determined in the future (Future Ranges). In addition to the proposed change to the FEIR prohibition on use of lead ammunition, the project activities proposed in the 2nd NPC exceeded one of the “lower thresholds” established for MMR because it includes construction of approximately 2,000 square feet (sf) of buildings for a pavilion and bleacher enclosure (which exceeds the lowered threshold of 500 square feet (sf) for a new building or structure).

A Secretary’s Certificate was issued on the September 15, 2006 NPC on November 9, 2006 that required the MANG to prepare a Supplemental EIR to provide additional information on baseline conditions, pollution prevention plans, on-site remedial investigations of specific small arms ranges and an analysis of ammunition alternatives.

REVIEW OF THE SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

The Supplemental EIR includes a detailed description of the MANG’s proposed 3-phase small arms range development program to return to live-fire training on a core group of ranges deemed to be most critical in satisfying the MANG’s small arms training requirements. As described in the Supplemental EIR, the Pollution Prevention Plan (P2 Plan) includes range design plans, range rehabilitation/reuse plans and range management plans and provides an overall environmental management strategy for the use of small arms ranges at Camp Edwards. The P2P also includes an evaluation and selection of the most appropriate BMPs and Operations, Maintenance and Monitoring (OM&M) Plans for individual small arms ranges the MANG is proposing for firing lead core ammunition. The Supplemental EIR also includes the results of the MANG’s lead fate and transport study and remedial investigations of SAR Ranges, and an analysis of ammunition alternatives.

Small Arms Range (SAR) Pollution Prevention Plan

The SAR Pollution Prevention Plan (P2 Plan) includes an evaluation of Best Management Practices (BMPs), proposed action thresholds, and operation and management plans to be employed at small arms training ranges at Camp Edwards. The P2Plan also includes proposed Range Design Plans and Operations, Maintenance and Monitoring (OM&M) Plans for the management of small arms ranges, including ranges utilizing lead-bullet ammunition. These Plans will include range-specific BMPs, applicable monitoring practices and specific thresholds for conducting metals recovery activities including the use of the STAPP bullet containment systems for the T, J and K Ranges.

The Supplemental EIR also discusses how P2 Plans for each range will:

- a) maximize bullet recovery and recycling;
- b) prevent or minimize bullet fragmentation and ricochets;

- c) prevent or minimize leaching of range-associated metals and other contaminants to groundwater; and
- d) include appropriate monitoring requirements, such as soil, groundwater, and lysimeter pore monitoring, and action thresholds that will trigger operational or design changes.

The Supplemental EIR includes a prioritized and phased implementation schedule for small arms ranges that the MANG has proposed for a return to live fire training using lead-bullet ammunition based on current and anticipated training requirements, capability and condition of current ranges and environmental management complexity. I anticipate that the P2 Plans, BMPs and OM&M plans presented in the Supplemental EIR will serve as a model to demonstrate the effectiveness of the MANG's proposed strategy for protection of water supply and wildlife habitat for other existing and future Camp Edwards Ranges and training areas.

Lead Fate and Transport Study

The Supplemental EIR contains a Lead Fate and Transport Study completed by the MANG to assess the fate of lead released to the environment from firing lead bullet ammunition at Camp Edwards; *Environmental Assessment of Lead at Camp Edwards, Massachusetts Small Arms Ranges, 2007*. The Lead Fate and Transport Study concluded that lead mobility is limited at Camp Edwards and as a result, lead has not migrated into groundwater at Camp Edwards. The Supplemental EIR discusses how the lead fate and transport study is being used to inform the final design of the SAR P2 Plan to minimize environmental exposure through the application of range-specific BMPs and OM&M plans.

Remedial Investigations

The Supplemental EIR includes the results of soil and groundwater analysis and other remedial investigations completed by the MANG for those ranges utilizing lead-bullet ammunition including the T, J, K and S Ranges. As described in the Supplemental EIR, the historical firing of small arms has resulted in the deposition of propellants from bullet cartridges and metals from projectile fragments in the near-surface soils located near the respective range firing lines and specific downrange target areas. The MANG has proposed to complete limited soil removal activities at J and K Ranges for soils found to contain small amounts of nitroglycerin and for impacted soils at I Range found to contain a limited amount of tungsten. The Remedial Investigations Report includes a discussion of how ongoing Camp Edwards training activities will avoid interference with any ongoing or future response actions that may be required. The Supplemental EIR also describes how soil and groundwater analysis and other remedial investigations are being used to inform the SAR P2 Plan and development of range-specific BMPs and operation, maintenance and monitoring plans.

According to the comments received from MassDEP, the Camp Edwards Impact Area and Training Ranges are classified as a disposal site and have been assigned a Release Tracking Number (RTN -4-15031) pursuant to M.G.L. c 21E and 310 CMR 40.000, the Massachusetts Contingency Plan (MCP). Accordingly, the MANG is required to report to MassDEP of any release of oil and/or hazardous materials encountered during the implementation of the MANG's SAR-IP. The MANG should consult with MassDEP's Bureau of Waste Site Cleanup (BWSC) in the preparation of range-specific Pollution Prevention Plans and Operation, Maintenance and

Management Plans to explore what impacts, if any, these projects might have on any/all 21E sites located in the Training Ranges, and to evaluate the MANG's need for retaining a Licensed Site Professional (LSP) to assist in the project's construction. The MANG should commit to ensuring that the project contractors and sub-contractors maintain an emergency response plan for performing appropriate response actions in the event contamination is encountered during project construction.

Alternatives - Ammunition

As described in the Supplemental EIR, the use of copper-based ammunition (Enhanced Performance Round (EPR)) recently became available for small arms range training activities at Camp Edwards. The MANG has received approval from the Environmental Protection Agency (EPA) and the EMC to use copper-based ammunition for training activities located on S and I Ranges. According to the Supplemental EIR and statements made by the MANG during consultations with the MEPA Office, copper-based ammunition has both performance and environmental benefits compared to the existing lead-based ammunition currently in use and will have little to no impact to small area range soils or groundwater resources at Camp Edwards. The MANG has begun to transition away from lead-based ammunition to copper-based ammunition as the preferred option for its future training activities. The Supplemental EIR includes a discussion of other non-lead ammunition alternatives to document the types of alternatives considered and the rationale for their elimination. The Supplemental EIR notes that while a variety of alternative ammunition are available, their use is considered problematic due to decreased training realism, uncertainty regarding environmental impacts and management techniques, and procurement difficulties.

Public Involvement

The Supplemental EIR includes a description of the MANG's ongoing Community Involvement Program including public outreach and involvement activities completed to date. The Supplemental EIR identifies more than 80 public meetings that have been held by the MANG, EPA and the EMC, to provide opportunities for public involvement including MMR site visits and SAR tours. The MMR Environmental and Readiness Center continues to publish an annual report, *Annual State of the Reservation Report*, which describes activities at Camp Edwards for the most recent training year.

Mitigation and Section 61 Findings

The Supplemental EIR includes draft Section 61 Findings for the Small Arms Range SAR Improvement Project for the EMC approval process. Subsequent to the filing of the Supplemental EIR to the MEPA Office, the MANG submitted to the MEPA Office updated Section 61 Findings for the Area-Wide Final EIR Master Plan that includes updated information on the current status of mitigation commitments identified as part of the Area-Wide Final EIR Master Plan.

According to the comments received from the EMC and the Association to Preserve Cape Cod (APCC), the MANG's mitigation commitments for small arms ranges included in the SAR-IP should be expanded to include proposed mitigation for all ranges in the Reserve, including ranges not proposed for future improvements and inactive ranges. The EMC and APCC

EEA# 5834

Supplemental EIR Certificate

September 28, 2012

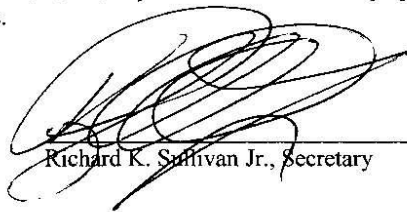
comment letters identify the need to remove debris and abandoned and/or obsolete infrastructure (targets, target rail systems, mounds, concrete and tanks) associated with inactive ranges where small arms have been fired. Specifically, the EMC comments identify the need for the MANG to complete a review of inactive range areas, compile an inventory of any/all infrastructure and debris and develop plans for their removal, especially where such removal is not addressed by the Impact Area Groundwater Cleanup Study Program or the Installation Restoration Program. The EMC comment letter also identified a number of inconsistencies in the southern boundary limits of the northern Training Area depicted on maps provided in the Supplemental EIR. In its comments on the Supplemental EIR, the ACPP has also recommended that the MANG expand its mitigation commitments to include the restoration of the streambed erosion found along the old jeep trail from A Range to Wood Road with minor re-grading and new plantings of native vegetation. I expect the MANG to work closely with the EMC and its Advisory Councils, the Small Arms Range Working Group and other stakeholders, to address the comments received on the Supplemental EIR.

Conclusion

Based on the information in the Supplemental EIR and after consultation with relevant public agencies, I find that no further MEPA review is required at this time. The project may proceed with obtaining required state permits.

September 28, 2012

DATE



Richard K. Sullivan Jr., Secretary

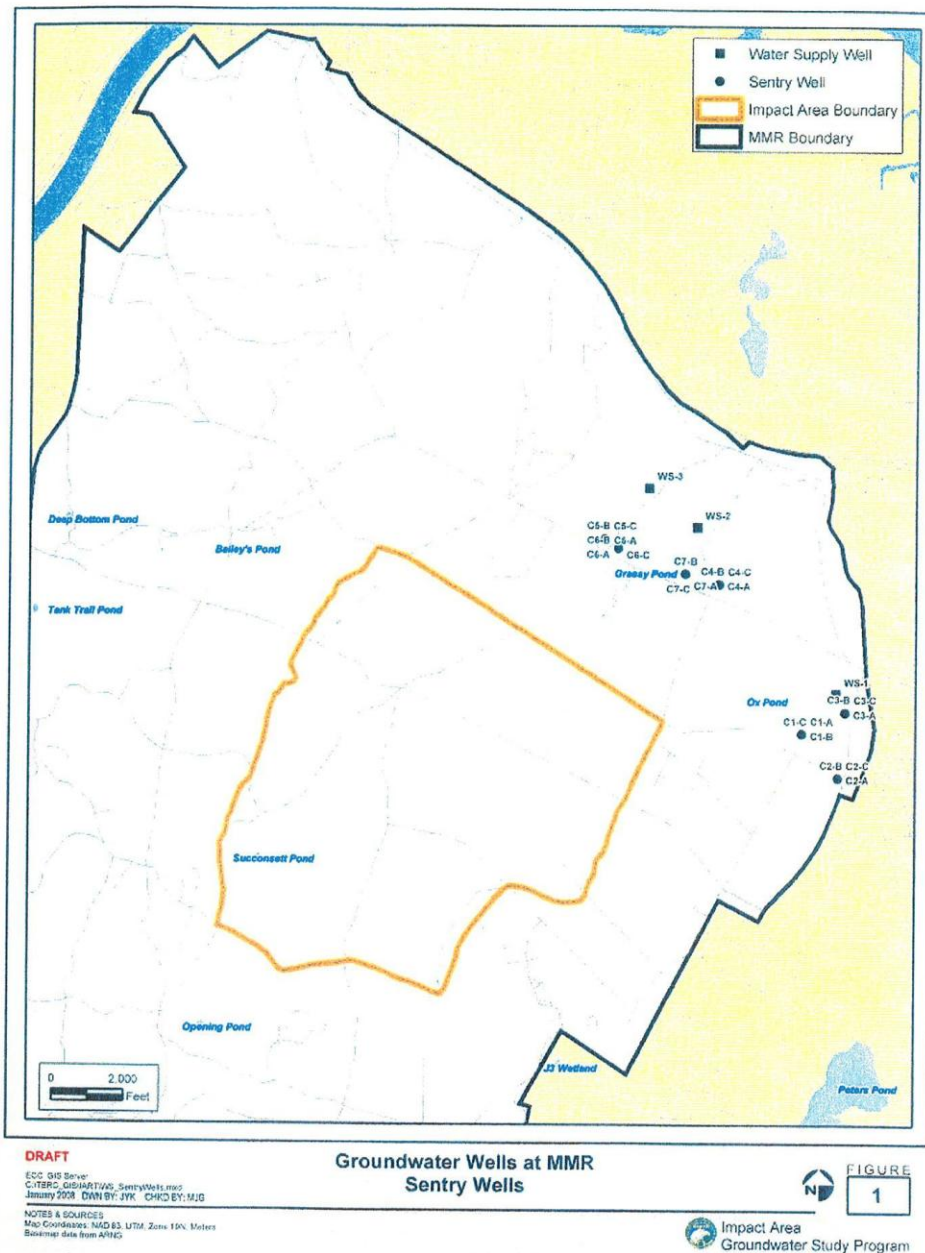
Cc: Mark J. Begley, Environmental Officer, Environmental Management Commission

Comments received:

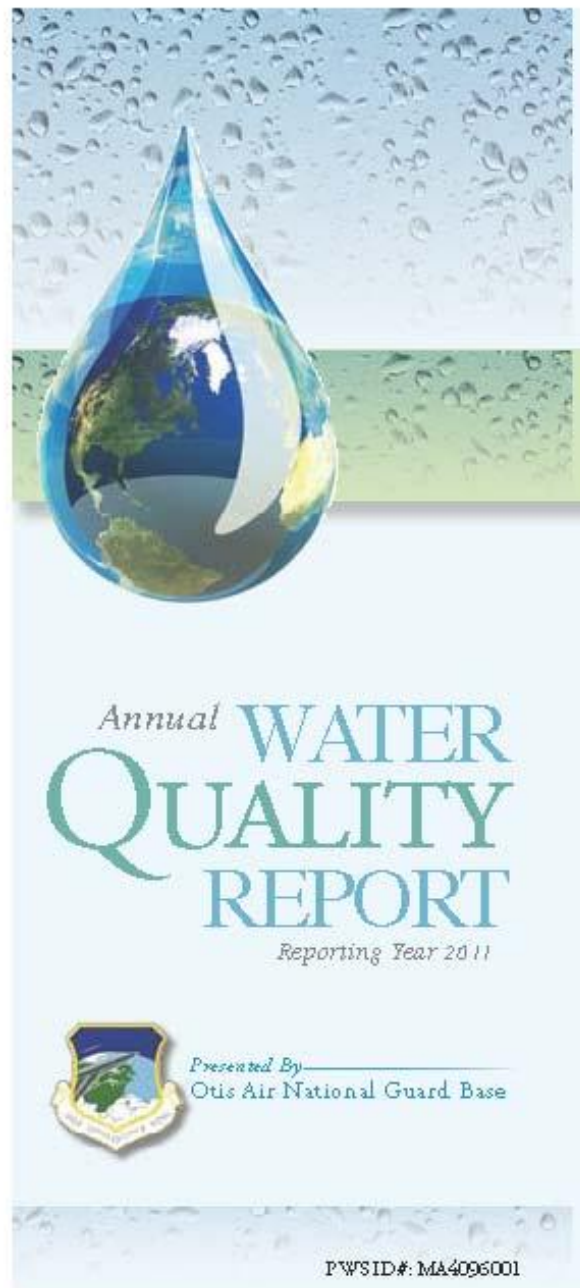
09/19/2012	Cape Cod Commission (CCC)
09/20/2012	Executive Office of Environmental Affairs, Environmental Management Commission (EMC)
09/20/2012	Association to Preserve Cape Cod (APCC)
09/20/2012	Natural Heritage and Endangered Species Program (NHESP)
09/21/2012	Department of Environmental Protection (MassDEP) - SERO

RKS Jr./NZ/nz
Supplemental EIR #5834

**APPENDIX E:
WATER SUPPLY INFORMATION**



ADD IN OTIS WATER QUALITY INFO



Meeting the Challenge

We are once again proud to present our annual water quality report covering all testing performed between January 1 and December 31, 2011. Over the years, we have dedicated ourselves to producing drinking water that meets all state and federal standards. We continually strive to adopt new methods for delivering the best-quality drinking water to you. As new challenges to drinking water safety emerge, we remain vigilant in meeting the goals of source water protection, water conservation, and community education while continuing to serve the needs of all our water users.

Please share with us your thoughts or concerns about the information in this report. After all, well-informed customers are our best allies.

The Benefits of Fluoridation

Fluoride is a naturally occurring element in many water supplies in trace amounts. In our system, the fluoride level is adjusted to an optimal level averaging one part per million (ppm) to improve oral health in children. At this level, it is safe, odorless, colorless, and tasteless. There are over 39 million people in 140 Massachusetts water systems and 184 million people in the U.S. who receive the health and economic benefits of fluoridation.

Important Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The U.S. EPA/CDC (Centers for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791 or <http://water.epa.gov/drink/hotline>.

Substances That Could Be in Water

To ensure that tap water is safe to drink, the Department of Environmental Protection (DEP) and the U.S. Environmental Protection Agency (U.S. EPA) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) and Massachusetts Department of Public Health (DPH) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Substances that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, or wildlife;

Inorganic Contaminants, such as salts and metals, which can be naturally occurring or may result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming;

Pesticides and Herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses;

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and which may also come from gas stations, urban stormwater runoff, and septic systems;

Radioactive Contaminants, which can be naturally occurring or may be the result of oil and gas production and mining activities.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

How Is My Water Treated and Purified?

Our drinking water is treated with potassium carbonate, sodium fluoride, and sodium hypochlorite. The water in this geographic area is naturally acidic, with an average pH of 5.9 (7.0 is neutral). Acidic water can be harmful to the distribution system. Potassium carbonate is used to buffer the water to as close to a neutral pH as possible. At the request of the U.S. Coast Guard, which is the owner and operator of the family housing area, sodium fluoride is added to the water. This compound has proven effective in strengthening teeth. Finally, sodium hypochlorite is used to disinfect the water supply by killing bacteria.

Where Does My Water Come From?

Our drinking water supply is provided entirely by groundwater. J-Well, which is located on Herbert Road, is our primary pumping station. We are also connected to the Upper Cape Regional Water Supply Cooperative. The Cooperative's water sources come from three wells located in the northeastern corner of Camp Edwards. On average, we provide up to 300,000 gallons of high-quality water every day. All of the Otis public water supply is drawn from the Sagamore Lens of the Cape Cod single-source aquifer. This lens runs from the Cape Cod Canal eastward into the town of Yarmouth. To learn more about our watershed on the Internet, go to the U.S. EPA's Surf Your Watershed Web site at <http://cfpub.epa.gov/surf/locate/index.cfm>.

Lead in Home Plumbing

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high-quality drinking water, but we cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Stormwater Pollution Prevention

Stormwater discharges have been identified as a significant source of water pollution in numerous nationwide studies of water quality. Each building/area operated by the 102nd has been evaluated and categorized, and Best Management Practices (BMP) have been implemented at industrial areas to ensure that processes do not adversely impact any stormwater runoff. BMPs include good housekeeping practices, minimization of exposure, spill prevention measures, construction of secondary containment structures, management of stormwater runoff, and employee training. For the 102nd, mandatory quarterly visual monitoring and voluntary quarterly analytical testing is conducted at each outfall area. The results of these examinations have not shown any detrimental effects on the quality of stormwater from the activities conducted by the 102nd.

Community Participation

On-base residents are also invited to raise any questions or concerns regarding drinking water at the Air Station Cape Cod community meeting. The date and time of this annual event will be posted in the Otis Notice.

QUESTIONS?

For more information about this report, or for any questions relating to your drinking water, please call the water supply superintendent, Mr. Richard Souza, at (508) 968-4102.

Water Main Flushing

Distribution mains (pipes) convey water to homes, buildings, and hydrants on base to include base housing. The water entering distribution mains is of very high quality; however, water quality can deteriorate in areas of the distribution mains over time. Water main flushing is the process of cleaning the interior of water distribution mains by sending a rapid flow of water through the mains.

Flushing maintains water quality in several ways. For example, flushing removes sediments like iron and manganese. Although iron and manganese do not pose health concerns, they can affect the taste, clarity, and color of the water. Additionally, sediments can shield microorganisms from the disinfecting power of chlorine, contributing to the growth of microorganisms within distribution mains. Flushing helps remove stale water and ensures the presence of fresh water with sufficient dissolved oxygen, disinfectant levels, and an acceptable taste and smell.

During flushing operations in your neighborhood, some short-term deterioration of water quality, though uncommon, is possible. You should avoid tap water for household uses at that time. If you do use the tap, allow your cold water to run for a few minutes at full velocity before use and avoid using hot water, to prevent sediment accumulation in your hot water tank.

Please contact us if you have any questions or if you would like more information on our water main flushing schedule.

Source Water Assessment and Protection

SWAP Explanation

The Source Water Assessment and Protection (SWAP) program, established under the federal Safe Drinking Water Act, requires every state to inventory land uses within the recharge areas of all public water supply sources; to assess the susceptibility of drinking water sources to contamination from these land uses; and to publicize the results to provide support for improved protection.

What is my system's ranking?

A susceptibility ranking of high was assigned to this system due to the absence of hydrogeologic barriers (e.g., clay) that can prevent contaminant migration.

Where can I see the SWAP report?

Information on obtaining the complete SWAP report is available by contacting the water supply superintendent at (508) 968-4102. The report is also available online at www.mass.gov/dep/water/drinking/4096001.pdf.

Potential Sources of Contamination

Being a military facility, Otis ANG Base has the potential of having fuel, chemicals, and other material(s) as possible sources of contamination.

What Are PPCPs?

When cleaning out your medicine cabinet, what do you do with your expired pills? Many people flush them down the toilet or toss them into the trash. Although this seems convenient, these actions could threaten our water supply.

Recent studies are generating a growing concern over pharmaceuticals and personal care products (PPCPs) entering water supplies. PPCPs include human and veterinary drugs (prescription or over-the-counter) and consumer products, such as cosmetics, fragrances, lotions, sunscreens, and household cleaning products. In the five years from 2005 to 2010, the number of U.S. prescriptions increased 12 percent to a record 3.7 billion, while nonprescription drug purchases held steady around 3.3 billion. Many of these drugs and personal care products do not biodegrade and may persist in the environment for years.

The best and most cost-effective way to ensure safe water at the tap is to keep our source waters clean. Never flush unused medications down the toilet or sink. Instead, check to see if the pharmacy where you made your purchase accepts medications for disposal, or contact your local health department for information on proper disposal methods and drop-off locations. You can also go on the Web at www.Earth911.com to find more information about disposal locations in your area.

Q & A

How much water does a person use every day?

The average person in the U.S. uses 80 to 100 gallons of water each day. During medieval times, a person used only 5 gallons per day.

How much emergency water should I keep?

Typically, 1 gallon per person per day is recommended. For a family of four, that would be 12 gallons for 3 days. Humans can survive without food for 1 month, but can only survive 1 week without water.

How many community water systems are there in the U.S.?

About 53,000 public water systems across the United States process 34 billion gallons of water per day for home and commercial use. Eighty-five percent of the population is served by these systems.

What's a Cross-connection?

Cross-connections that contaminate drinking water distribution lines are a major concern. A cross-connection is formed at any point where a drinking water line connects to equipment (boilers), systems containing chemicals (air conditioning systems, fire sprinkler systems, irrigation systems), or water sources of questionable quality. Cross-connection contamination can occur when the pressure in the equipment or system is greater than the pressure inside the drinking water line (backpressure). Contamination can also occur when the pressure in the drinking water line drops due to fairly routine occurrences (main breaks, heavy water demand), causing contaminants to be sucked out from the equipment and into the drinking water line (backsiphonage).

Outside water taps and garden hoses tend to be the most common sources of cross-connection contamination at home. The garden hose creates a hazard when submerged in a swimming pool or when attached to a chemical sprayer for weed killing. Garden hoses that are left lying on the ground may be contaminated by fertilizers, cesspools, or garden chemicals. Improperly installed valves in your toilet could also be a source of cross-connection contamination.

Community water supplies are continuously jeopardized by cross-connections unless appropriate valves, known as backflow prevention devices, are installed and maintained. We have surveyed all industrial, commercial, and institutional facilities in the service area to make sure that all potential cross-connections are identified and eliminated or protected by a backflow preventer. We also inspect and test each backflow preventer to make sure that it is providing maximum protection.

For more information, review the Cross-Connection Control Manual from the U.S. EPA's Web site at <http://water.epa.gov/infrastructure/drinkingwater/pws/crossconnectioncontrol/index.cfm>. You can also call the Safe Drinking Water Hotline at (800) 426-4791.

Sampling Results

During the past year, we have taken numerous water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The tables below show only those contaminants that were detected in the water. Although all of the substances listed here are under the Maximum Contaminant Level (MCL), we feel it is important that you know exactly what was detected and how much of the substance was present in the water. The state requires us to monitor for certain substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included along with the year in which the sample was taken.

REGULATED SUBSTANCES							
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL (MCL)	MCLG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chlorine (ppm)	2011	[4]	[4]	1.65	0.04-1.65	No	Water additive used to control microbes
Combined Radium (pCi/L)	2009	5	0	0.4	NA	No	Erosion of natural deposits
Fluoride (ppm)	2011	4	4	1.0	0.72-1.0	No	Water additive that promotes strong teeth
Nitrate (ppm)	2011	10	10	1.4	ND-1.4	No	Runoff from fertilizer use; Leaching from septic tanks, sewages; Erosion of natural deposits
Perchlorate (ppb)	2011	2	NA	0.16	ND-0.16	No	Inorganic chemicals used as oxidizers in solid propellants for rockets, missiles, fireworks and explosives
THMs (Total Trihalomethanes) (ppb)	2011	80	NA	8	ND-8	No	By-product of drinking water disinfection

Tap water samples were collected for lead and copper analyses from sample sites throughout the community.

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (BOTH%TILE)	SITES ABOVE AL/ TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2011	1.3	1.3	0.4	0/20	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead (ppb)	2011	15	0	3	0/20	No	Corrosion of household plumbing systems; Erosion of natural deposits

UNREGULATED SUBSTANCES ¹				
SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
Chloroform (ppb)	2011	2.0	ND-2.0	By-product of drinking water disinfection
Sodium (ppm)	2011	12	ND-12	Some sodium is always expected to be present in ground water

¹Unregulated contaminants are those for which the U.S. EPA has not established drinking water standards. The purpose of unregulated contaminant monitoring is to assist the EPA in determining their occurrence in drinking water and whether future regulation is warranted.

Definitions

90th Percentile: Out of every 10 homes sampled, 9 were at or below this level.

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable

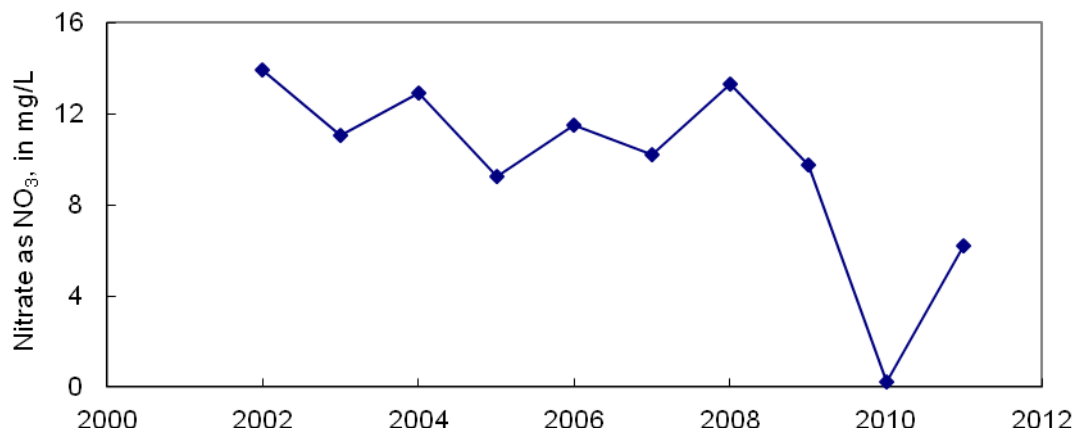
ND (Not detected): Indicates that the substance was not found by laboratory analysis.

pCi/L (picocuries per liter): A measure of radioactivity.

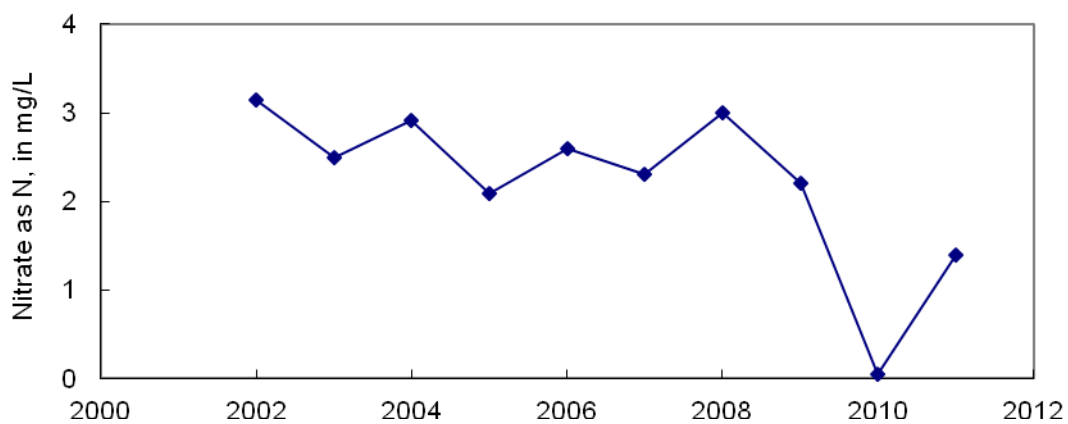
ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

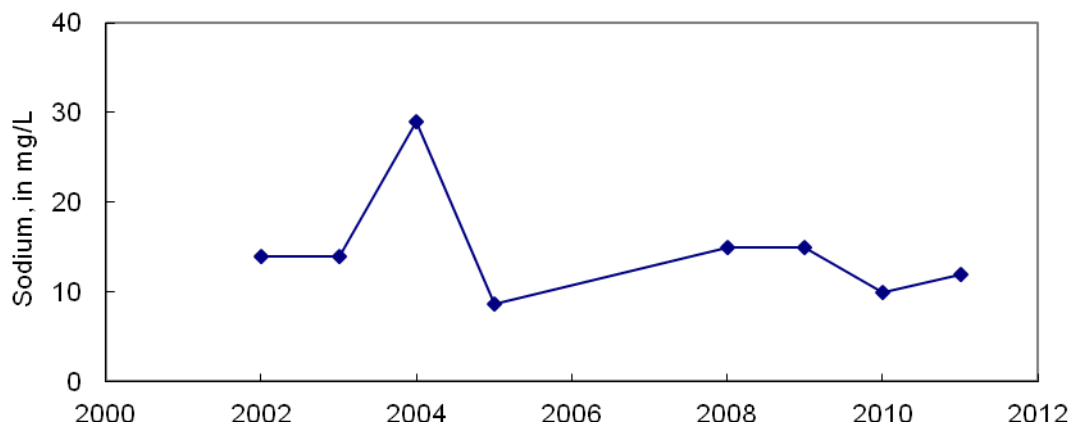
102nd Intelligence Wing Water Supply Reports



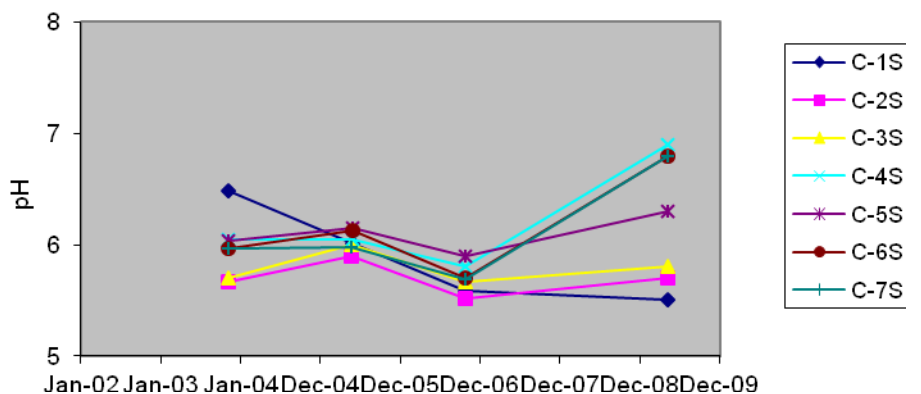
102nd Intelligence Wing Water Supply Reports



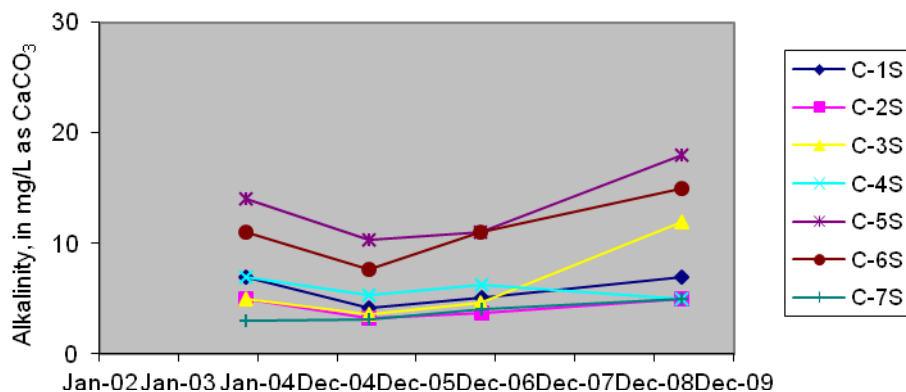
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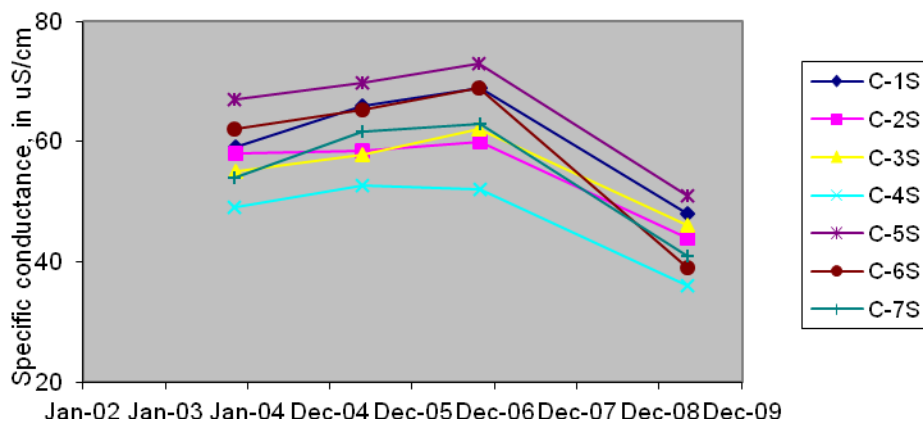
**Upper Cape Regional Water Supply Cooperative
pH - Shallow wells**

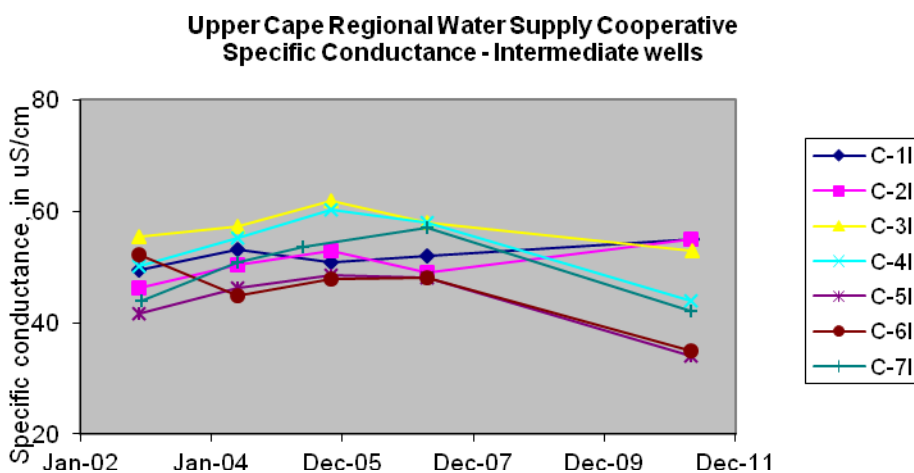
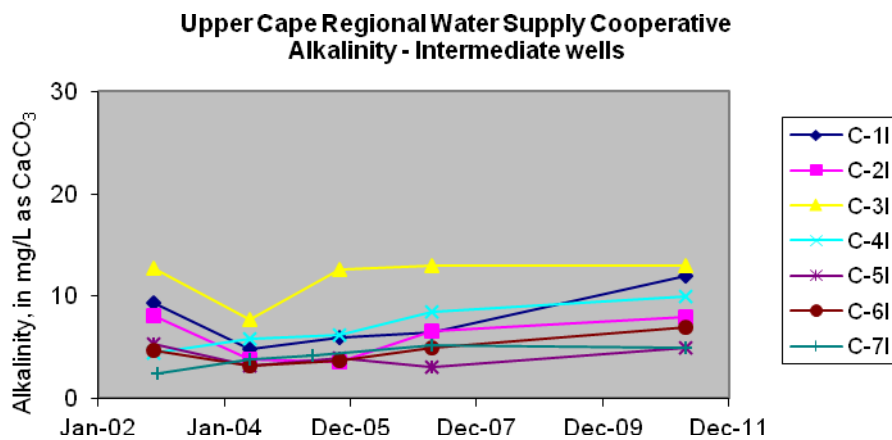
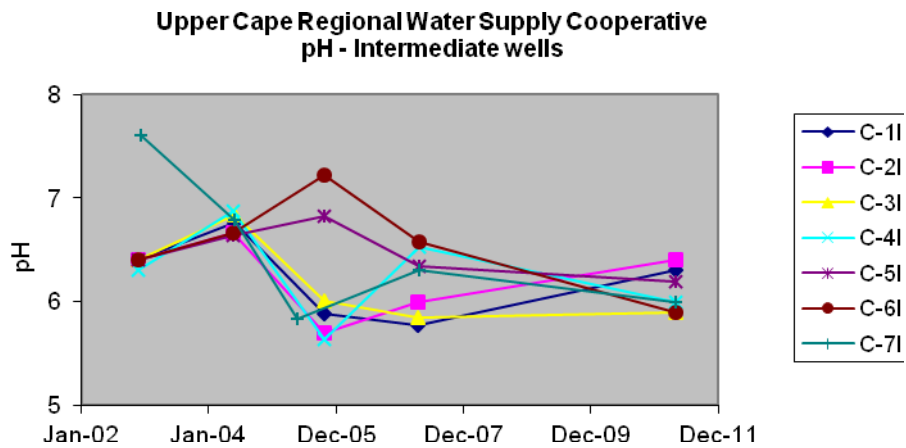


**Upper Cape Regional Water Supply Cooperative
Alkalinity - Shallow wells**

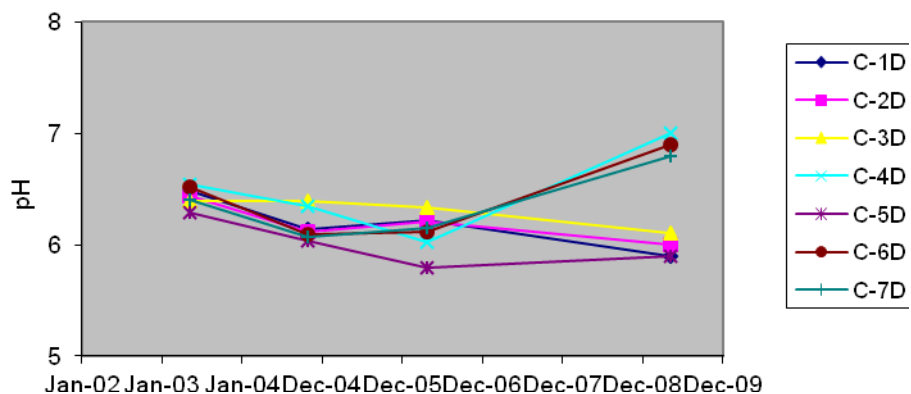


**Upper Cape Regional Water Supply Cooperative
Specific Conductance - Shallow wells**

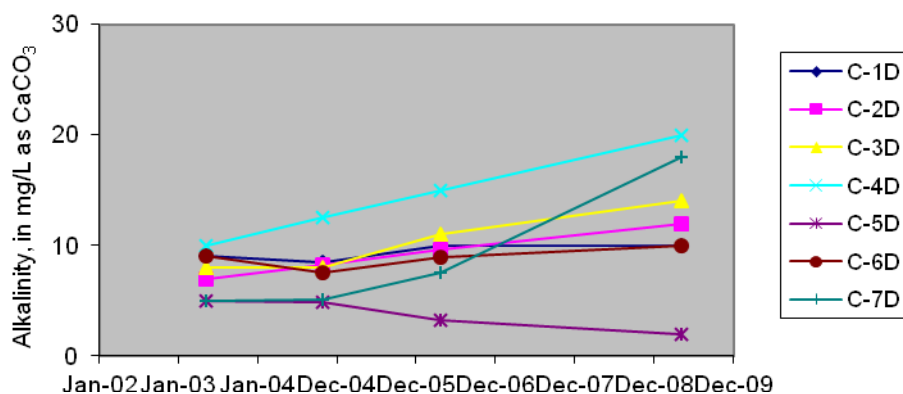




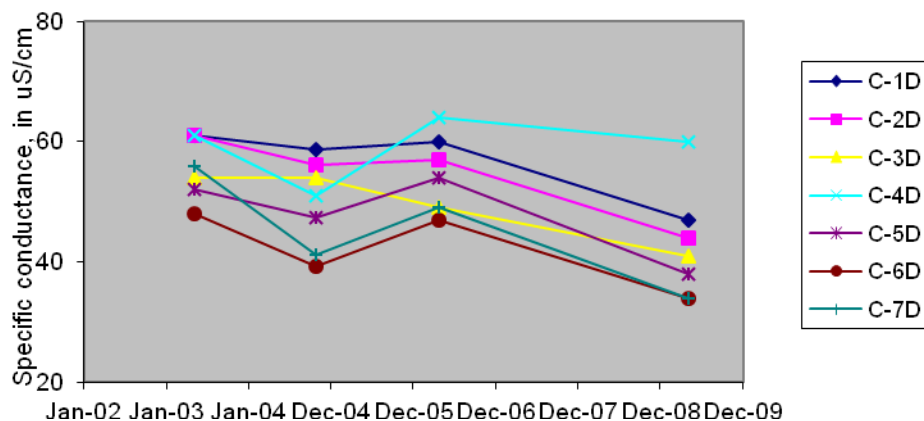
**Upper Cape Regional Water Supply Cooperative
pH - Deep wells**



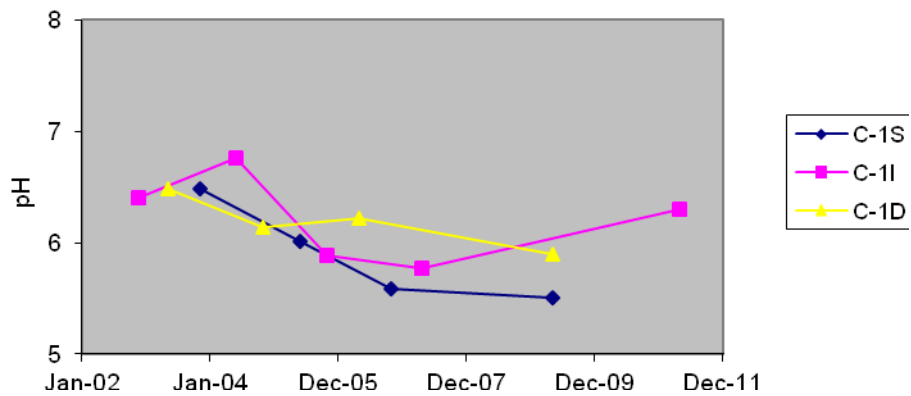
**Upper Cape Regional Water Supply Cooperative
Alkalinity - Deep wells**



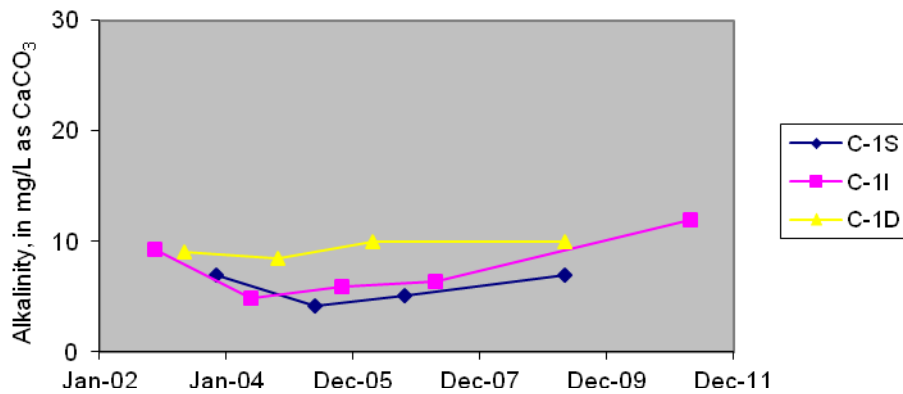
**Upper Cape Regional Water Supply Cooperative
Specific Conductance - Deep wells**



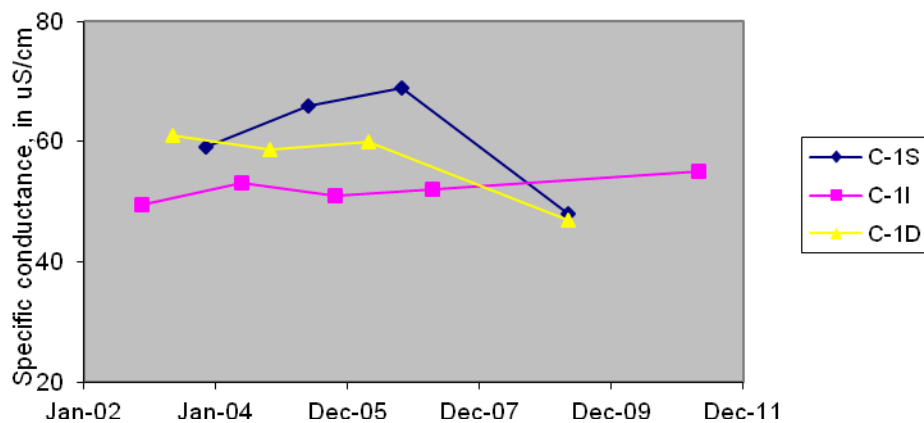
**Upper Cape Regional Water Supply Cooperative
pH - Well cluster 1**



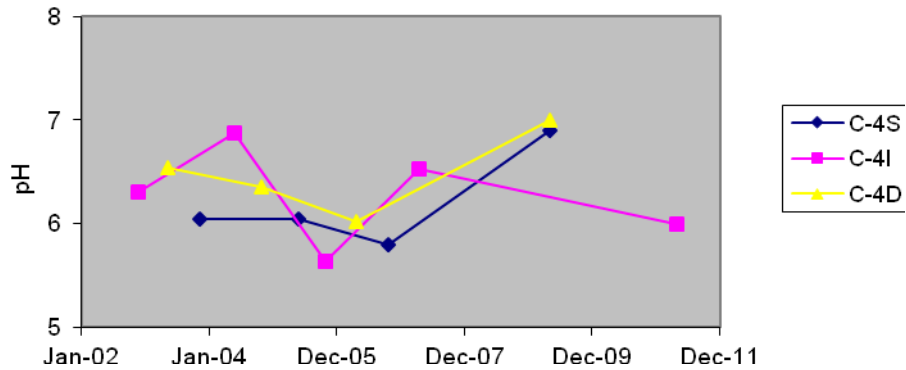
**Upper Cape Regional Water Supply Cooperative
Alkalinity - Well cluster 1**



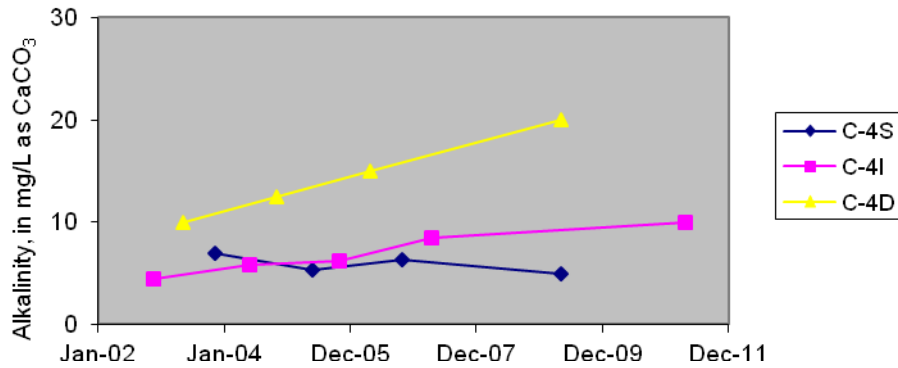
**Upper Cape Regional Water Supply Cooperative
Specific Conductance - Well cluster 1**



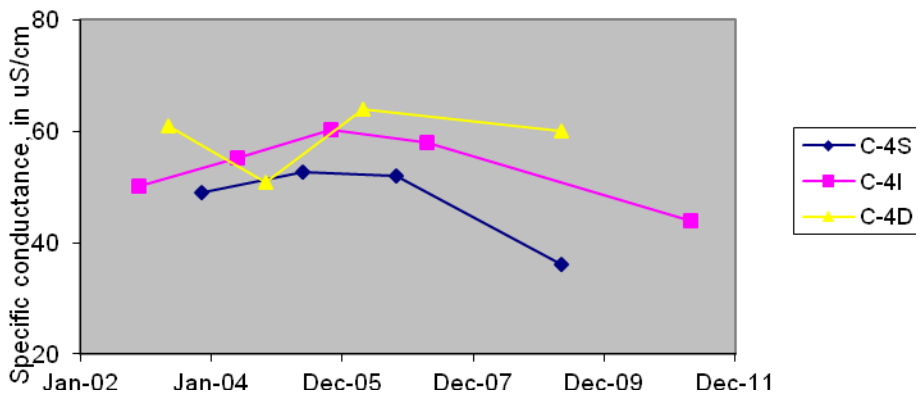
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pH - Well cluster 4**



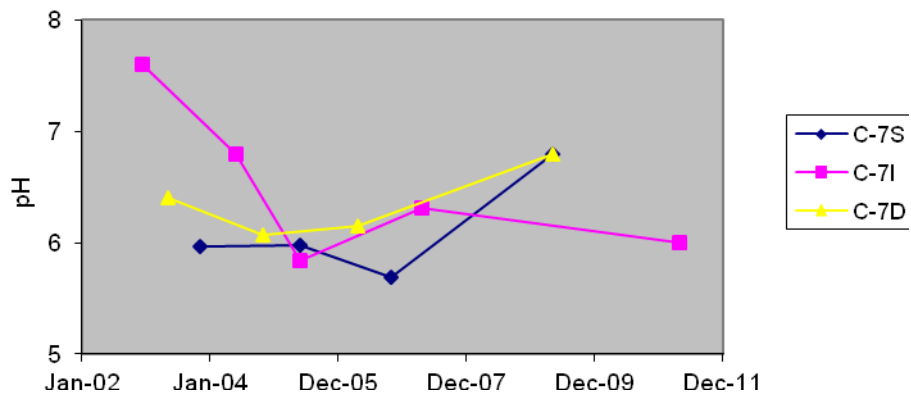
**Upper Cape Regional Water Supply Cooperative
Alkalinity - Well cluster 4**



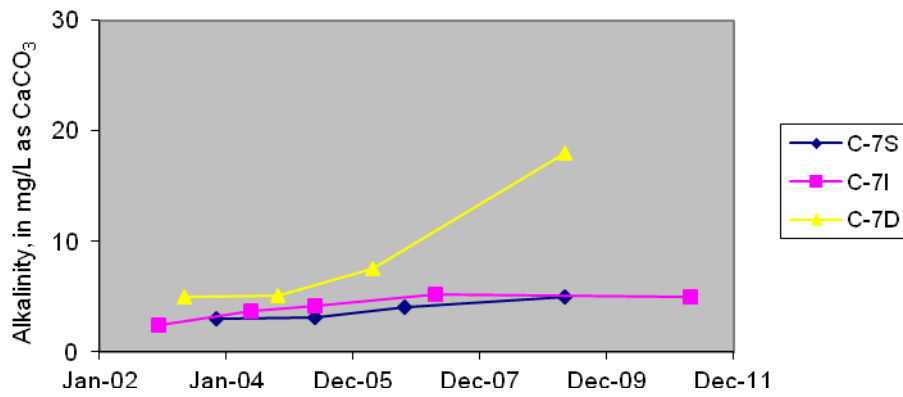
**Upper Cape Regional Water Supply Cooperative
Specific Conductance - Well cluster 4**



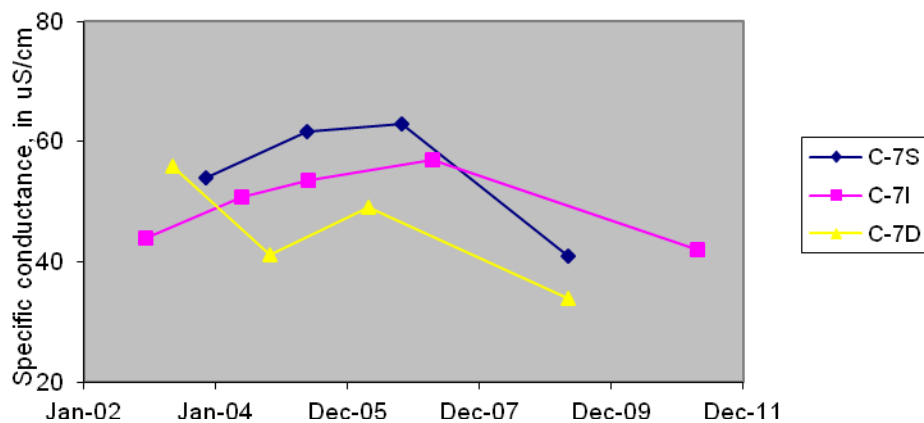
**Upper Cape Regional Water Supply Cooperative
pH - Well cluster 7**



**Upper Cape Regional Water Supply Cooperative
Alkalinity - Well cluster 7**



**Upper Cape Regional Water Supply Cooperative
Specific Conductance - Well cluster 7**



**APPENDIX F:
RARE SPECIES REPORTING
AND
INVASIVE PLANT SPECIES CONTROL
TY 2002 – TY 2012**

LIST OF RARE SPECIES REPORTED TO NHESP HISTORY											
	Individuals Reported										
Common / Scientific Names	TY 2002	TY 2003	TY 2004	TY 2005	TY 2006	TY 2007	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
BIRDS											
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	15	43	54	60	58	65	64	68	50	26	40
Northern Harrier (<i>Circus cyaneus</i>)	9	10	3	3	4	4	4	4	9	4	5
Upland Sandpiper (<i>Bartramia longicauda</i>)	17	6	17	24	48	10	15	29	29	3	3
Northern Parula (<i>Parula Americana</i>)	0	0	0	0	0	0	0	1	0	0	0
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	1	0	0	0	0	0	0	1	0	0	0

LIST OF RARE SPECIES REPORTED TO NHESP HISTORY											
Common / Scientific Names	TY 2002	TY 2003	TY 2004	TY 2005	TY 2006	TY 2007	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
BIRDS											
Vesper Sparrow (<i>Pooecetes gramineus</i>)	0	0	2	3	1	1	6	3	8	3	1
Common Tern (<i>Sterna hirundo</i>)	9	0	0	0	0	0	0	0	0	0	0
Whip-poor-wills (<i>Caprimulgus vociferous</i>)	0	0	0	0	0	0	0	0	0	0	201
REPTILES and AMPHIBIANS											
Eastern Box Turtle (<i>Terrapene carolina Carolina</i>)	32	31	27	17	9	7	15	10	13	29	13
REPTILES and AMPHIBIANS											
Eastern Spadefoot (<i>Scaphiopus holbrookii</i>)	0	1	0	0	0	0	0	0	0	0	0
LIST OF RARE SPECIES REPORTED TO NHESP HISTORY											

FINAL

Common / Scientific Names	TY 2002	TY 2003	TY 2004	TY 2005	TY 2006	TY 2007	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
ODONATES											
Comet Darner (<i>Anax longipes</i>)	0	2	2	7	2	1	3	9	6	14	4
Spatterdock Darner (<i>Aeshna mutata</i>)	9	8	11	15	11	10	24	13	7	10	14
BUTTERFLYS											
Frosted Elfin (<i>Callophrys irus</i>)	0	0	0	17	0	0	0	0	0	0	0
PLANTS											
Adder's Tongue Fern (<i>Ophioglossum Pusillum</i>)	0	8,400	4,477	38	3,020	1,600	458	0	138	48	84
Broad Tinker's Weed (<i>Triosteum perfoliatum</i>)	37	37	172	132	54	41	99	69	56	233	332

LIST OF RARE SPECIES REPORTED TO NHESP HISTORY											
Common / Scientific Names	TY 2002	TY 2003	TY 2004	TY 2005	TY 2006	TY 2007	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
Torrey's Beak Rush (<i>Rhynchospora Torreyana</i>)	0	238	2,060	23,000	20,000	6,000	2,350	2,550	4,800	2,606	4,416
Total	129	8,776	6,825	23,916	23,207	7,739	3,038	2,757	5,116	2,976	5,113
Note: Counts of Upland Sandpipers, Grasshopper Sparrows, Vesper Sparrows and Northern Harriers through TY 2010 include counts of these species on the 1,500 acre airfield / airfield grassland area that had previously been part of Otis ANGB.											

NATIVE AND NON-NATIVE INVASIVE PLANT SPECIES CONTROL ACTIVITY ON CAMP EDWARDS										
HISTORY										
Common / Scientific Names	TY 2003	TY 2004	TY 2005	TY 2006	TY 2007	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
Honeysuckle (non-native) (<i>Lonicera sp.</i>)	0	0	160	3,644	2,771	4,919	382	1,920	1,247	760
Autumn olive (<i>Elaeagnus umbellata</i>)	0	0	70	1,871	988	1,400	1,509	62	173	834
Oriental bittersweet (<i>Celastrus orbiculatus</i>)	0	0	6	449	1,551	0	155	74	75	58
Multiflora rose (<i>Rosa multiflora</i>)	0	0	2	236	726	237	139	53	58	191
Scotch broom (<i>Cytisus scoparius</i>)	2	15	1	4	5	0	1	0	0	0
Phragmite stems (<i>Phragmites australis</i>)	0	10	3	0	0	0	0	0	0	0
Japanese Knotweed (<i>Polygonum cuspidatum</i>)	3	50	15	0	0	0	0	44	0	0

NATIVE AND NON-NATIVE INVASIVE PLANT SPECIES CONTROL ACTIVITY ON CAMP EDWARDS

HISTORY

Common / Scientific Names	TY 2003	TY 2004	TY 2005	TY 2006	TY 2007	TY 2008	TY 2009	TY 2010	TY 2011	TY 2012
Japanese barberry (<i>Berberis thunbergii</i>)	25	0	0	25	286	0	0	0	1	0
Forsythia (<i>Forsythia</i> sp.)	0	0	0	204	0	0	0	0	1	0
Common reed (<i>Phragmites australis</i>)	0	0	0	33	0	0	0	0	0	0
Glossy Buckthorn (<i>Rhamnus frangula</i>)	0	0	0	0	55	0	0	0	0	0
Black Locust (<i>Robinia pseudoacacia</i>)	0	0	0	0	12	0	0	0	0	0
Privet (<i>Ligustrum</i> sp.)	0	0	0	0	7	0	0	0	0	0
Winged Euonymus (<i>Euonymus alata</i>)	0	0	0	0	5	0	0	525	0	0
Pitch pine (<i>pinus rigida</i>)	0	0	0	0	0	0	0	0	1,076	6,735
TOTALS	30	75	257	6,466	6,406	6,556	2,186	2,678	2,631	8,578

Notes: 1. Documentation of eradication activity commenced in TY 2003.
 2. Most of the eradication activities have occurred in the Cantonment Area, not the Reserve.
 3. A major pitch pine elimination effort occurred in the Cantonment Area in TY 2012 as part of a wildland fire chainsaw course and several other efforts.

**APPENDIX G:
PYROTECHNICS**

M116A1 Hand Grenade Simulator



Final Summary Report

Massachusetts Army National Guard

Camp Edwards

19 January 2012
(Revised: 31 May 2012)

Introduction

In 1997, the use of artillery and grenade simulator devices at Camp Edwards was suspended after the U.S. Environmental Protection Agency issued Administrative Order 2. One of the constituents in the pyrotechnics, perchlorate, was of particular concern due to its solubility and potential effects on human health and the environment.

The M116A1 Hand Grenade Simulators, perchlorate free, are hand-thrown military training devices used to simulate battlefield noises and effects during training. These devices help prepare Soldiers for the rigors of combat by simulating stress and confusion of artillery and hand grenade explosions—an important aspect of military training. Realistic training is a critical component of Soldier training, and factors that create realism—smoke, dust, noise, and pressure—all help create the confusion associated with realistic battle conditions. Many of the tasks that Soldiers are required to train on prior to deployment concentrate on reaction to contact, and combat contact normally takes the form of an explosion from either indirect fire or an improvised explosive device (IED). Pyrotechnics can be used to simulate IEDs, which have caused 80 percent of the US casualties in Afghanistan.

The M116A1 Hand Grenade Simulator has been reformulated by the Department of the Army and is now perchlorate free. The basic reformulation is primarily composed of environmentally benign, biodegradable constituents. The simulators are constructed of cardboard tubes that contain a black powder and aluminum mixture, along with sodium salicylate, (a substance used as a pain reliever), red gum (eucalyptus), potassium chlorate, which is the same constituent as in matches and ultimately breaks down to oxygen and potassium chloride (a naturally occurring mineral), dextrin (breakdown product of starch), and potassium nitrate (a naturally occurring mineral used as a fertilizer).

On December 9, 2009, the EMC voted unanimously to authorize the executive director of the EMC to issue a conditional approval letter in accordance with the recommendations of the Science Advisory and Community Advisory Councils. The vote also noted the MAANG's Environmental & Readiness Center's recommendation for the simulated grenade's inclusion on the approved list. Subsequently the USEPA approved use of the grenade simulators. The M116A1 was approved for use on Camp Edwards on 24 March 2010 by the United States Environmental Protection Agency (USEPA) and the Massachusetts Environmental Management Commission (EMC). The USEPA approval is a limited authorization for a two year period beginning the day the first pyrotechnic device was used in the Camp Edwards Training Area. See Appendix A for 24 March 2010 approval letters from the EMC and USEPA.

Compliance with EMC and USEPA approvals required: no grenade simulator use in wetland buffer areas, in water supply Zone 1 areas, in noise sensitive areas, such as near the base boundary, or when conditions indicate a fire hazard. In addition, Soldiers policed debris as required by regulation and policy. The EMC and USEPA limited use to 1000 per acre per year for two years while any possible environmental effects were evaluated.

It was required that information on simulated grenade use and monitoring, and relevant issues encountered during the applicable training year be included in the training section of the Annual Report. Please see annual report for reported information. The approval specifically required including the numbers of simulated grenades used in the Reserve and, where applicable, the Training Areas where they were used.

The approved M116A1 was first used on Camp Edwards on 7 June 2010 as part of the XCTC training exercise. The number of simulators used was 480 in 2010 and 7 in 2011. Sampling, as required, showed non-detect for chlorate and there were no apparent environmental effects from using this training aid.

A requirement of the EMC's approval was to notify the EMC's Executive Director through Range Bulletins or email when the simulated grenades are proposed to be used in training in the Reserve. This was done in 2010. However, use of these simulators, 1-2 August of 2011, was not included in that weeks' Range Bulletin or emailed to the EMC as required. A Reserve unit requested use of the M16A1 hand grenade simulators on hand in the ASP. The unit used a total of 7 simulators, 1 of which was a dud. With the exception of notification to the EMC through the Range Bulletin or email, Camp Edwards followed protocol and filled out all the required paperwork, overlays, reports, and put this into the yearly report. The lack of EMC notification has been corrected by revising the SOP; all scheduled use of M116A1 Hand Grenade Simulators on Camp Edwards will be included within the Camp Edwards Range Bulletin and in the event of an onsite request and approval the EMC and ERC will be notified by email of the intent of the requesting unit to use the M116A1 Hand Grenade Simulator.

All dunnage to include wires and plastic caps was collected and turned into the ASP or through Range Control to the ASP for disposal.

Working with USEPA, the Massachusetts Department of Environmental Protection and the EMC, the Guard developed a sampling plan to test soils. The plan was approved (Appendix B) and sampling was done during a period of intense training at Camp Edwards during the summer of 2010. Results of the sampling showed non-detect for Chlorate, the constituent of concern (Appendix C). A briefing of results was given during the combined meeting of the EMC's advisory groups, the Science Advisory Group and the Community Advisory Group, on August 25, 2010.

These new pyrotechnics have greatly enhanced the realism of pre-mobilization training at Camp Edwards. The Guard will continue to use these new simulators to the benefit of Soldier training and is requesting permanent approval based on experience and environmental sampling.

In regards to dud hand grenade simulators; all such items will be handled in accordance with the hand grenade simulator SOP (Appendix D). The relevant section is as follows:

DUDs:

- a. In accordance with TM 9-1370-207-10 (Pyrotechnic Simulator Operator's Manual) do not handle duds.
- b. Mark the location, Notify Range Control, Wait 1 hour.
- c. Range Control will notify post EOD for response to the training site.

As a course of process Camp Edwards Range control receives reports of a dud from the using unit. The reporting unit marks the location and maintains a safe standoff distance of 30 meters and notifies range control. After an hour the dud simulator can be properly handled by EOD or certified ASP personnel. The dud simulator is then placed in an ammo can, only by EOD or ASP personnel, and then transported and stored at a designated bunker at the ASP. Certified ASP personnel can demilitarize any duded M116A1. These items can also be brought to an approved offsite location for disposal by EOD personnel. In 2010 there were two duded M116A1 Hand Grenade Simulators. These simulators were retrieved by a MAARNG EOD unit. The EOD unit then coordinated with the Army Corp of Engineers

and was able to have the 2 duds included within a Blow in Place on Camp Edwards. For 2011 there was one dud that is stored at the ASP. The ASP will continue to store the 1 M116A1 dud. The 387th EOD unit on Camp Edwards will eventually transport the DUD to Devens Reserve Base to conduct a blow in place (BIP). These actions are conducted a couple of times a year based on need and safety. There is no immediate timeline to conduct a BIP for the one M116A1 as there is no environmental or immediate safety concern.

Numbers, Training Area Use, Sampling, and Analysis:

The M116A1 was first used on Camp Edwards on 7 June 2010 as part of the XCTC training exercise. During training year 2010, 473 Hand Grenade Simulators were used-319 in the Camp Edwards Training Area and 154 in the Cantonment Area and in 2011 only 7 were used in the Camp Edwards Training Area. Difference in use of this item between 2010 and 2011 was due to the fact that there was the XCTC exercise in 2010 and in 2011 the MAARNG was in an off cycle deployment year with little need for this type of device during the 2011 training cycle. Table 1 identifies the general training area location at which these pyrotechnic devices were used. Refer to Figure 1 for training area locations.

Table 1. Hand Grenade Simulator Use, Camp Edwards Training Area, 2010-2011

Training Year	Training Area	Number Used
2010	A 3	5
2010	A 4	61
2010	B 9	23
2010	B 10	15
2010	B 11	42
2010	C 14	50
2010	C 15	50
2010	BA 1	20
2010	BA 6	28
2010	Wheelock Road	10
2010	North Power Lines	15
2010	Cantonment Area	154
2011	C14	3
2011	BP27	2
2011	A4	2
Total:		480

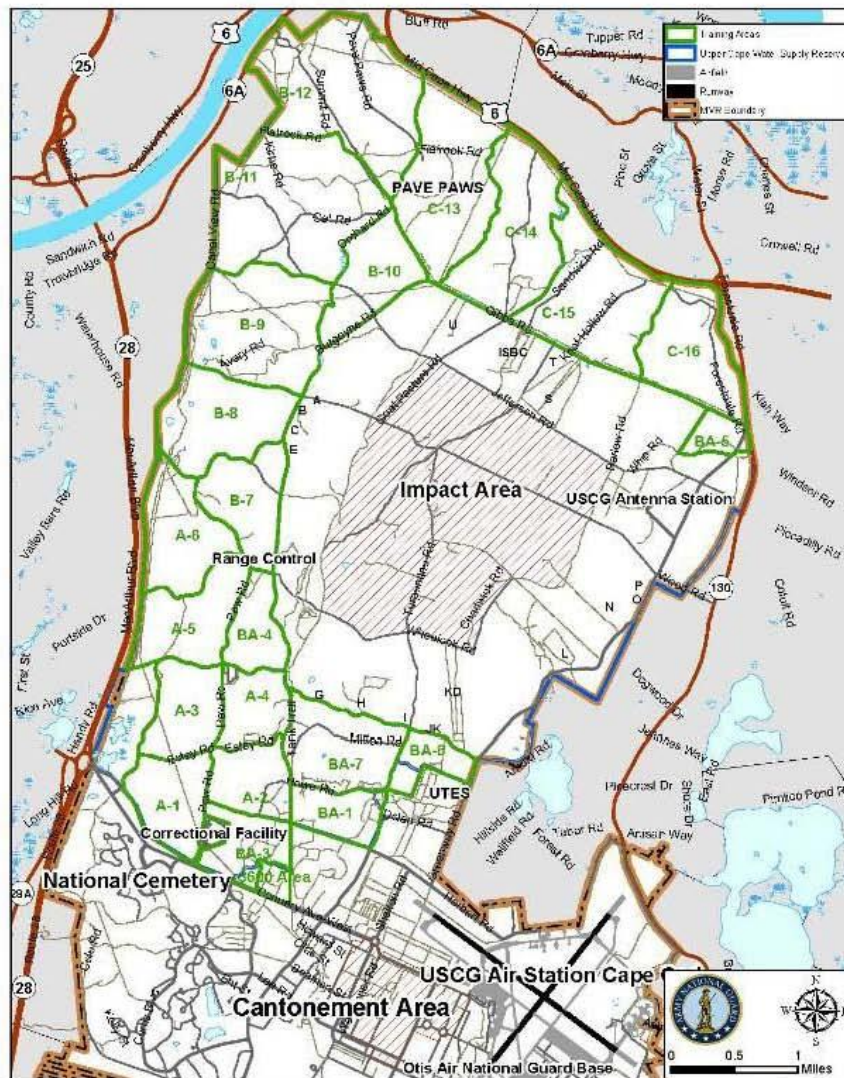


Figure 1. Camp Edwards (MMR), 2010-2011

As a requirement of the approval for use of the M116A1 Hand Grenade Simulator, the MAARNG sampled soils for the presence of chlorate associated with the pre-combustion composition of these devices. Sampling was conducted, in accordance with a signed project note (Appendix B), both before and after the exercise, with both pre- and post-exercise sampling completed.

It was requested by the EMC that the MAARNG sample surface soil for Chlorate following the 2010 Exportable Combat Training Capability (XCTC) exercise. The usage of the simulators was the highest during this training exercise in June 2010. It was requested that four or five grab samples be taken from a high use area (or areas) and analyzed for chlorate. It was also requested that at least one background sample be taken for the same location for comparison purposes. To this end, the E & RC contacted the Camp Edwards Trainers to determine the best sampling location. "Checkpoint Number Two" was identified as an expected highest use area for XCTC 2010.

Checkpoint Two was located on an unpaved section of Turpentine Road approximately 0.3 miles south of Wheelock Road and north of Pocasset-Forestdale Road. This was an ideal location for using IED simulated devices since convoys were regularly stopped here, and as such this particular location was used heavily in training scenarios for XCTC 2010.

On June 4, 2010, immediately prior to the XCTC training, surface samples were taken from the hard packed roadbed at Checkpoint Two. Three soil samples were scraped from the roadbed using a stainless steel spoon which was decontaminated by rinsing with distilled water between samples. Samples were immediately placed in amber glass sample collection bottles and labeled. Samples were transported in a cooler on ice and were refrigerated. XCTC training ended on June 21, 2010. Per a request from the USEPA multi-increment samples were taken. The samples were collected from the surface (0 -1 ") and delivered to a certified laboratory for analysis using EPA Method 300.1. All results were non-detect for Chlorate (Appendix C). Accordingly there were no known environmental impacts in using these devices on Camp Edwards during the two year review period of 2010-2011.

Appendix A

EMC and USEPA Approval Letters



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
ENVIRONMENTAL MANAGEMENT COMMISSION
Building 1204, Camp Edwards, MA 02542-5003
(508) 968-5127 Telephone (508) 968-5128 Facsimile

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Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
MARY B. GRIFFIN
RICHARD SULLIVAN
Commissioners

March 24, 2010

COL Francis M. McGinn
Commander, Camp Edwards
Headquarters, Camp Edwards
Camp Edwards, MA 02542

RE: Upper Cape Water Supply Reserve/Camp Edwards; Simulated Hand Grenade Approval

Dear Colonel McGinn:

This letter is in response to your request letter dated October 13, 2009. In that letter you, on behalf of the Massachusetts Army National Guard (MAANG), requested joint review and approval of the M116A1 Hand Grenade simulator (DODIC L601). The approval would include placement of the M116A1 Hand Grenade simulator (simulated grenade) on the list of munitions authorized for use at Camp Edwards pursuant to Chapter 47 of the Acts of 2002 and the Environmental Performance Standards. In a letter dated 12 January 2010, and in presentations to the Environmental Management Commission (EMC) and its Advisory Councils, the MAANG stated no more than 1000 simulated grenades would be used per year and the use of the simulated grenades would be distributed over an area considerably greater than 1 acre in size within the Upper Cape Water Supply Reserve.

At its December 9, 2009 meeting, the Environmental Management Commission (EMC) voted to authorize the EMC's Executive Director to issue a conditional approval letter in accordance with the recommendations of the Science Advisory Council and Community Advisory Council. The vote also noted the MAANG's Environmental & Readiness Center's recommendation for the simulated grenade's inclusion on the approved list. The MAANG conducted its own technical review and concluded that training with the simulated grenade could be accomplished while protecting the water supply and wildlife habitat.

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The Science Advisory Council (SAC) and the Community Advisory Council, at their respective meetings on November 18, 2009 and December 3, 2009, were briefed on the simulated grenades. The Advisory Councils provided recommendations through unanimous votes to the EMC on the use of the simulated grenade. Given the number of simulated grenades proposed to be used by the MAANG each year, and the distribution of the training over a wide area, the contaminants released by the simulated grenade were not believed by the SAC to be a threat to the resources in the Reserve. The Community Advisory Council supported the SAC vote and deferred to the SAC's expertise in the matter. The SAC conditioned their recommendation to the EMC that the use of the simulated grenades be revisited in two years to be certain that the conceptual site model presented by the MAANG remains valid, i.e., no significant impact on groundwater and wildlife habitat based on a check of the environment where the simulated grenades were used.

In the December 9, 2009 vote, the EMC acted under the purposes and provisions of Chapter 47 of the Acts of 2002, "An Act Relative to the Environmental Protection of the Massachusetts Military Reservation," and the Environmental Performance Standards. The use was conditionally approved in accordance with the SAC's recommendation, the Environmental Performance Standards, and may be revoked at any time for failure to comply with the conditional authorization, if grenade formulations significantly change, or monitoring indicates a problem. The EMC vote directed that best management practices (BMPs) be included as conditions of the EMC's approval letter. A public comment period on the simulated grenades was also conducted by the Environmental Protection Agency (EPA) and no comments were received from the public.

The EMC hereby approves the use of the requested simulated grenades, subject to the following conditions:

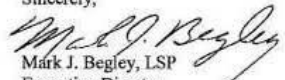
1. All simulated grenade use will be in accordance with the Environmental Performance Standards, Camp Edwards Regulations, BMPs, and all other applicable laws, regulations, Standard Operating Procedures (SOPs), the EPA authorization, and any other applicable approvals.
2. Best Management Practices will be developed and employed to prevent or mitigate adverse impacts, including litter, from the simulated grenade use. All adverse impacts shall be prevented and/or mitigated to the maximum extent feasible.
3. The MAANG shall notify the EMC's Executive Director through Range Bulletins or e-mail when the simulated grenades are proposed to be used in training in the Reserve.
4. The simulated grenade will not be used during fire hazard conditions, in Zone I areas of water supply wells, in restricted wetland buffer areas, nor in noise sensitive areas close to residential areas at the base boundaries.
5. Sixty (60) days prior to the end of the two year authorized use period, the MAANG shall submit a summary report on the use and environmental impacts of the simulated grenade to the EMC. The summary report shall identify the number of items used and the training areas over which they were used during the authorization period. It shall also present

sampling and analysis data, collected according to a sampling and analysis plan developed by the MAANG jointly with the EPA and the EMC, in consultation with the Massachusetts Department of Environmental Protection (MassDEP). The purpose of the summary report is to document and assess any environmental impacts resulting from the use of the grenade simulator. The contents of the report must also be presented to the Science Advisory Council and the Small Arms Working Group, and the results of the report will be used by the EMC and the MAANG's Environmental & Readiness Center to determine if the grenade simulator will remain on the approved list of munitions.

6. Should observation or monitoring of the training areas indicate the potential for damage to the resources within the Upper Cape Water Supply Reserve as a result of the use of the simulated grenades, the use or practices will be modified to eliminate the potential damage as directed by the EMC and the MAANG.
7. The Annual State of the Reservation Report's training section dedicated to the use of simulated munitions use shall include a section discussing the simulated grenades use, and monitoring, and relevant issues encountered during the applicable training year. More specifically, this section shall include numbers of simulated grenades used in the Reserve and, where available, the training areas where they were used. The summary in the Annual State of the Reservation Report shall also include confirmation that the chemicals and materials used in the grenade simulators have not significantly changed.
8. The community shall continue to be informed of the status of training through periodic updates at EMC meetings, Community Advisory Council meetings, Science Advisory Council meetings, and on the MAANG's Camp Edward/Environmental & Readiness Center web site, and other applicable outreach opportunities.

If you have any questions or comments regarding this letter, please contact me at (508) 968-5127.

Sincerely,


Mark J. Begley, LSP
Executive Director,
Environmental Management Commission

cc: EMC Commissioners
EPA
MassDEP



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

24 March 2010

Colonel Francis M. McGinn
Post Commander MANG
Camp Edwards, MA 02542

RE: Training Range and Impact Area, Massachusetts Military Reservation, EPA
Docket No. SDWA I-97-1030, Modification for Limited Authorization for M116A1
Hand Grenade Simulator (DODIC L601) Training

Dear Col. McGinn,

In a letter dated 26 October 2009, the Massachusetts National Guard (MANG), on behalf of itself and the National Guard Bureau (NGB), requested the United States Environmental Protection Agency (EPA) to modify the Scope of Work (SOW) to Administrative Order SDWA I-97-1030 (AO2) issued pursuant to Section 1431(a) of the Safe Drinking Water Act with respect to the Massachusetts Military Reservation (MMR). Specifically, the MANG requested approval to resume training using the reformulated pyrotechnic device M116A1 Hand Grenade (DODIC L601).

On 13 January 2010, EPA responded to this request. In its response, EPA proposed to modify AO2 and submitted this proposal for public comment. The public comment period ended on 16 February 2010 and no comments have been received from the public.

Thus, this letter constitutes EPA's modification to AO2 to allow a limited authorization for a two year period, under which MANG personnel and personnel from other military agencies, will be permitted to conduct training utilizing the reformulated pyrotechnic device - M116A1 Hand Grenade (DODIC L601).

Background:

In its efforts at protecting the sole source Cape Cod Aquifer, EPA has issued four administrative orders, including three pursuant to the Safe Drinking Water Act. The second Administrative Order, known as AO2, was issued in May 1997. Among other provisions, AO2 includes the suspension of particular military training activities at the Training Range and Impact Area of MMR (AO2, Scope of Work, Section II.A.1). Among the activities suspended were "[a]ll use of pyrotechnics at or near the Training Range and Impact Area". (AO2, Scope of Work, Section II.A.1.f).

AO2 also includes provision for modifying Scope of Work Requirements based on specified demonstrations. (Paragraph 125). If a Respondent to AO2 believes that a modification to the Work specified pursuant to AO2 is necessary and appropriate, the Respondent may petition EPA for a determination on the potential modification. Included among the bases for such a modification is "documentation demonstrating that the use of a ... pyrotechnic that is suspended pursuant to this Order does not present a threat of harm to the public or the environment that would warrant its continued suspension under this Order".

26 October 2009 NGB/MANG Petition for Modification:

As described above, the NGB/MANG petition requested a modification to allow use of the DODIC L601 M116A1 Hand Grenade for training purposes. According to the petition, this M116A1 Hand Grenade Simulator contains none of the hazardous constituents listed in Paragraphs 19 thru 22 of AO2, nor does this device contain perchlorate. The petition also states that these items are comprised of "black powder, aluminum and silica sand" and that "the grenade simulators contain no constituents of concern that would present a threat of harm to the public or the environment."

EPA Findings:

Based on a careful review of the information provided, EPA does not believe that the statements made in the petition and referenced above are completely accurate. Per the project note attached to the 26 October 2009 petition, Testing of Artillery and Grenade Simulators at Camp Edwards (dated 13 August 2009); the M116A1 contains the following constituents:

- 40 grams Flash Composition
 - 8% Flaked Aluminum
 - 92% Black Powder
- 41 milligrams Fuse Igniter Charge
 - 88% Potassium Chlorate
 - 10% Charcoal
 - 2% Dextrin
- 2 grams Primer Paste
 - 67% Potassium Nitrate
 - 14% Charcoal
 - 10% Binder Cell Nitrate
 - 9% Sulfur
- Safety Fuse
 - Cotton
 - Black Powder
 - Primer Paste
- Ignition Blasting Fuse Assembly (M3A1)
 - Steel Wire
 - 67mg Cadmium Chromate (49% Cd, 23% Cr)

Ferrule
 Steel Wire
 67mg Cadmium Chromate (49% Cd, 23% Cr)

0.3 grams Copper Alloy Ignition Charge Wire Assembly
 95% Copper
 4.92% Zinc
 0.05% Iron
 0.03% Lead

Some of the constituents described above can be harmful to public health and the environment depending on the quantity. In a letter dated 12 January 2010, MANG has indicated that they will use no more than 1000 grenades per year in an area of 1 acre in size at MMR. EPA finds that given the number of items to be used by the MANG in a given year, the size of the area where the items will be used and the amount of contaminants contained in the M116A1 grenade, EPA does not expect that the use of these items in this manner will present a threat to the sole source aquifer.

Modification:

Based on the above discussion and findings, EPA hereby modifies AO2 as specified below.

1. Modified AO2, Appendix A (Scope of Work), ¶II.A.1.f, as follows:

f. All use of pyrotechnics at or near the Training Range and Impact Area except as provided in Appendix D:

2. Newly added Appendix D to AO2 now allows a limited authorization to use one type of pyrotechnic device, the M116A1 Hand Grenade (DODIC L601), for a two year period to commence the first day of use. Effective immediately, EPA hereby modifies AO2 to append Appendix D at the end of AO2 and Appendix D is now fully enforceable as a part of AO2.

This action does not modify any other provision of the Statement of Work or the main body of AO2. This modification may itself be modified or withdrawn by EPA at any time on twenty-four hours' written notice. This modification is effective immediately.

If you have any questions about the terms of this modification, please contact Lynne Jennings at 617-918-1210 or Ljennings.lynnne@epa.gov.

Sincerely,



H. Curtis Spalding
Regional Administrator, EPA New England

cc: Mark Begley, EMC
Len Pinaud, Mass DEP
Mike Ciaranca, MANG
Jo-Anne Palmer, MANG
Kent Gonser, IAGWSP
Desiree Moyer, EPA
Tim Conway, EPA
Ron Fein, EPA

SCOPE OF WORK
MASSACHUSETTS MILITARY RESERVATION
TRAINING RANGE AND IMPACT AREA

Appendix D to
EPA Region I Administrative Order
SDWA I-97-1030

I. INTRODUCTION AND PURPOSE

This Limited Authorization for the use of one type of pyrotechnic device authorizes Respondents to conduct training under specified conditions for a limited time at Massachusetts Military Reservation (MMR) on Cape Cod, Massachusetts. This Limited Authorization is appended to the Administrative Order, Docket Number SDWA I-97-1030 (the "Order"), issued by the United States Environmental Protection Agency (EPA) regarding the Training Range and Impact Area at MMR, and specifies the conditions under which Respondents may conduct such training and the Work that Respondents must perform associated with such training.

II. LIMITED AUTHORIZATION

- A. Authorized Period: This Limited Authorization is in effect for a two year period beginning the day the first pyrotechnic device, M116A1 Hand Grenade (DODIC L601), is used on the MMR Training Ranges.
- B. During the authorized period, Respondents and persons operating under their supervision may use the reformulated pyrotechnic device, the M116A1 Hand Grenade (DODIC L601), subject to the following conditions:
 - 1. No more than 1000 of these pyrotechnic devices, M116A1 Hand Grenade (DODIC L601) shall be used within a one year time period.
 - 2. All metal wires associated with this device will be turned-in as accountable dunnage. This is also specified in the 13 August 2009 Project Note, Testing of Artillery and Grenade Simulators at Camp Edwards.

Page 5 of 8

3. The limited authorization is conditioned upon compliance with all conditions established by the Environmental Management Commission.
4. Respondents shall provide EPA with copies of all documents or reports required by the Environmental Management Commission for consideration during the authorized period.
5. This approval is subject to periodic audits, including samples of environmental media, to be conducted by EPA or its contractors throughout the authorized period.
6. The limited authorization includes a requirement that, sixty days prior to the end of the two year authorization period, the MANG shall submit a summary report on the use and environmental impacts of the M116A1 Hand Grenade simulator. This summary report shall identify the number of items used and the area over which they were used during the authorization period. This report shall also present sampling and analysis data, collected according to a sampling and analysis plan developed jointly with EPA and the EMC, to demonstrate environmental impacts from the use of this hand grenade simulator. The EPA will evaluate this report and determine if future continued authorization shall be authorized.
7. Respondents shall schedule all training activities authorized by this Limited Authorization in a manner that does not interfere with, or slow down, the schedule for completing the investigation and cleanup required under the AOs. If a conflict arises, the investigation and cleanup activities take priority over any training, and training shall be

rescheduled. Respondents shall be responsible for communicating and conferring with the Army's Impact Area Groundwater Study Program (IAGWSP) to ensure that the requirements of this paragraph are satisfied. A violation of the requirements of this paragraph may result in modification or withdrawal of this Limited Authorization pursuant to Paragraph II.G.

8. This authorization is limited to one type of pyrotechnic device, the reformulated M116A1 Hand Grenade only.
- C. The conditions of Paragraph II.B are fully enforceable requirements of the Order and violations of any of the above conditions may be subject to penalties under the Order.
 - D. After the conclusion of the authorized period, Respondents may not utilize any pyrotechnic devices at or near the Training Range and Impact Area.
 - E. Respondents are responsible for supervising their own personnel, personnel from other agencies, and any contractors or consultants (including other government agencies) that Respondents engage or authorize to conduct any activities utilizing the pyrotechnic M116A1 Hand Grenade (DODIC L601) on the MMR Training Ranges. Respondents shall ensure that all persons conducting activities utilizing this M116A1 Hand Grenade (DODIC L601) at MMR Training Ranges comply with the requirements of this Order, other administrative orders issued by EPA with respect to MMR, and all applicable law. Respondents may be liable and subject to penalties for any violations of this Order, other administrative orders issued by EPA with respect to MMR, or other applicable law, caused by any persons conducting activities at the MMR Training Ranges.
 - F. Except as specifically stated in this Limited Authorization, Respondents remain obligated to comply with all the terms and conditions of the Order.

- G. The TPC or the Regional Administrator may modify or withdraw this Limited Authorization at any time upon twenty-four hours written notice.

Appendix B

Project Note: Sampling Plan for Grenade Simulators at Camp Edwards

Environmental and Readiness Center Camp Edwards, Massachusetts		PROJECT NOTE	
Confirmation of ☐ ☐ ☐		Date Held Not applicable Location Not applicable Date Issued June 22, 2010 Recorded By Issued By	
Subject SAMPLING PLAN FOR GRENADE SIMULATORS AT CAMP EDWARDS		MAARNG	
Item	Action Required By		
1.0	<u>INTRODUCTION</u> From 1997 to 2010, the Massachusetts Army National Guard (MAARNG) suspended the use of artillery and grenade simulator devices on Camp Edwards pursuant to the U.S. Environmental Protection Agency's (EPA) Administrative Order SDWA I-97-1-030 ("AO2"). This order was issued based on findings related to potential environmental impact to groundwater below the base. Pyrotechnic devices used on MMR in the past contained such chemicals as hexachloroethane, zinc oxide mixtures, lead thiocyanate, nitroglycerin, diethylphthalate and acetone, all chemicals which have been eliminated in the reformulated devices. Perchlorate was also one of the constituents in the simulators. Perchlorate is a contaminant of high solubility and has potential effects on human health. Subsequently, the Department of Defense took the initiative to develop a simulated Hand Grenade which uses no perchlorate nor any of the other chemicals mentioned above. In "AO2", an allowance was made by EPA for modification of the "Scope of Work" prohibiting use of pyrotechnics in the Training Reserve. Specifically the AO allowed for "documentation demonstrating that the use of a propellant or pyrotechnic that is suspended pursuant to this order does not present a threat of harm to the public or the environment that would warrant its continued suspension under this order". Further, as described in the ENVIRONMENTAL PERFORMANCE STANDARDS of July 11, 2007 under CAMP EDWARDS TRAINING AREA GENERAL PERFORMANCE STANDARDS, "Blank ammunition for small arms and simulated munitions may be used in areas outside of the small arms ranges, using only blank ammunition and simulated munitions identified on an approved list of munitions. Joint review and approval for the inclusion on the list shall be through the Environmental & Readiness Center (E &RC) and the EMC." In letters dated 24 March, 2010, the MAARNG was given approval for use of the newly reformulated M116A1 Hand Grenade Simulator by both EPA and the EMC with conditions.		

The work proposed in this Project Note addresses the requirements of the EMC Approval Letter of March 24, 2010 and the EPA Approval Letter of the same date. Through previous sampling and constituent analysis, the MAARNG has provided supporting evidence that the use of reformulated pyrotechnics "does not present a threat of harm to the public or environment that warrants its continued suspension under this order". This field sampling is verification to help obtain permanent EPA approval for use of the new M116A1 Hand Grenade Simulator on Camp Edwards. This work is also in support of obtaining the above cited permanent listing on the E&RC and EMC list of approved munitions.

In recent discussions between EMC, E&RC and Range Control representatives, a general sampling design was outlined. EPA and MassDEP input has also been sought per the approval letters mentioned above. Further discussion of the project and results will take place at the Small Arms Working Group (SARWG) Meetings.

2.0 OBJECTIVE

The objective of the proposed sampling and analysis is to obtain data to confirm that the reformulated simulators are appropriate for permanent use at Camp Edwards, and to support the MAARNG's request for permanent modification of "AO2" to allow the use of these reformulated pyrotechnics as an appropriate and vital part of military training.

3.0 DESCRIPTION OF SIMULATOR DEVICES

The M116A1 Hand Grenade simulators are hand thrown military training devices used to simulate battlefield noises and effects during troop maneuvers and training. The M116A1 has a 6-11 second delay followed by a flash/bang with a 125dB report. The M116A1 simulator consists of a M3A1 friction type initiator and a piece of safety fuse with 40 grams of a loose black powder/aluminum mixture. The simulator body consists of a 2 piece cylindrical cardboard tube measuring 4 inches long by 1.5 inches in diameter.

Use of these devices to prepare soldiers for the rigors of combat by simulating the stress and confusion is an important aspect of military training.

The simple cardboard tubes contain these specific constituents:

Black powder (a mixture of sulfur, charcoal and potassium nitrate);
Sodium salicylate (substance also used as a pain reliever);
Red gum (eucalyptus);
Aluminum (second most abundant metal in Earth's crust);
Potassium chlorate (the most common chlorate in industrial use – breaks down to oxygen, and potassium chloride - a naturally occurring mineral);
Dextrin (breakdown product of starch);
Potassium nitrate (naturally occurring mineral used as a fertilizer).

There is a metal wire visible on the outside, similar in appearance to a paperclip, and internally a wire can be seen in the drawings. These do not enter into the environment, but are held onto by the soldier when activating the device and turned in later as dunnage. Turning in dunnage by the soldiers is important as an accounting activity.

Because of this there should be no metal scraps being introduced to the environment with use of these simulators.

The detailed composition of the simulators is reflected in the following table:

	MA116A1 Hand Grenade Simulator- New Design
Flash Composition 40 g	Aluminum (flaked) 8 % Black Powder 92%
Fuse Igniter Charge 41 mg	Potassium Chlorate 88% Charcoal 10% Dextrin 2%
Primer Paste 2g	Potassium Nitrate 67% Charcoal 14% Binder Cell Nitrate 10% Sulfur 9%
Safety Fuse	Cotton Black Powder Primer Paste
Ignition Blasting Fuse (M3A1) Assembly	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ferrule	Steel Wire
	Cadmium Chromate 0.067 g (49% Cd/ 23% Cr)
Ignition Charge Wire Assembly 0.3 g Copper Alloy	Copper 95%, Zinc 4.92% Iron 0.05%, Lead 0.03%

4.0 SAMPLING AND ANALYSIS PROCEDURES

The EMC has requested the MAARNG sample surface soil for chlorate following the upcoming Exportable Combat Training Capability (XCTC) exercise. It is expected that the usage of the simulators will be highest for the year 2010 during this relatively short training period in June. Initially it was requested that four or five grab samples be taken from a high use area (or areas) and analyzed for chlorate. It was also suggested that at least one background sample should be taken for the same location for comparison purposes. To this end, the E & RC contacted Camp Edwards Trainers to determine the best sampling location. "Checkpoint Number Two" was identified as an expected highest use area for XCTC.

Checkpoint Two is located on an unpaved section of Turpentine Road approximately 0.3 miles south of Wheelock Road and north of Pocasset-Forestdale Road. This is an ideal location for using IED simulated devices since convoys will be regularly stopped here, and as such this particular location will be used heavily in training scenarios for the XCTC exercise.

Once this location was determined as the best sampling site, E & RC personnel prepared to collect background samples. On June 4, 2010, immediately prior to the

XCTC training, surface samples were taken from the hard packed roadbed at Checkpoint Two. Three soil samples were scraped from the roadbed using a stainless steel spoon which was decontaminated by rinsing with distilled water between samples. Samples were immediately placed in amber glass sample collection bottles and labeled. Samples were transported in a cooler on ice and have been kept refrigerated awaiting approval of the test methodology.

XCTC training ended on June 21. Per EPA request multi-increment samples will be taken as more representative than grab samples to look at any measurable residual levels of chlorate in soil as a result of training with the M116A1 Hand Grenade Simulators. As soon as practicable after the training exercise multi-increment samples will be taken from the same location as the background samples, or other high use area if appropriate.

The sampling date will be coordinated with the regulators so that the regulators are afforded an opportunity to observe sample collection.

The samples will be collected from the surface (0 - 1") and delivered to a certified laboratory for analysis using EPA Method 300.1

5.0 SAMPLE PREPARATION

Samples will be handled in accordance with the Impact Area Groundwater Study Program Quality Assurance Project Plan (IAGWSP QAPP). To make the samples as representative as possible, the sample extraction process will be modified to include the following:

- Air drying on foil lined drying racks,
- Sieve through a #10 Sieve (2 mm),
- Homogenization by hand in zip-lock bags,
- 1-2 gram sub-samples taken for EPA Method 300.1 Chlorate extracted in 100 ml's DI-water.

Standard reporting and minimum detection limits specified in the QAPP will be achieved for all analyses or the results may be rejected during data validation.

6.0 EVALUATION OF SAMPLE RESULTS

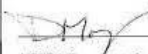
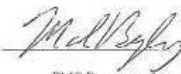
Results of soil sampling will be provided to stakeholders and discussed at a SARWG meeting. The results will be evaluated to determine if permanent training with the simulator devices is acceptable in terms of environmental protection.

7.0 SCHEDULE AND NEXT STEPS

With approval of this Project Note, the MAARNG will perform the analysis of the background samples and prepare for the sampling and analysis of the post exercise samples. Coordination steps include coordinating with Camp Edwards Headquarters, USACE and coordinating with Range Control. The regulators will be notified 48 hours in advance of the sampling so that they have the opportunity to be present.

8.0 CONCURRENCE

Concurrence with the activities presented in this project note is represented by the signatures below:

 USEPA Representative <i>24 June 10</i> <i>no actual meeting</i> <i>attested with present</i> <i>addendum</i>	 MassDEP Representative <i>6/23/10</i>
 MAARNG Representative <i>6/23/10</i>	 EMC Representative

Sampling Protocol for M116A1 Hand Grenade Simulators

Three multi-increment samples will be collected from 50 x 50 foot grids in the identified high use area. The samples will be made up of 50 increments collected from the surface to 1 inch deep. Soil and any vegetation will be included. Two replicates will be collected from one of the grids.

Appendix C

Soil Sampling Results: Chlorate



TestAmerica Laboratories, Inc.

July 21, 2010

Ms. Laurie Ekes
Environmental Chemical Corp.
PB 519 Gaffney Road
Otis ANGB, MA 2542

Re: Laboratory Project No. 29000
Case: 29000; SDG: EM627

Dear Ms. Ekes:

Enclosed are the analytical results for the samples that were received by TestAmerica Burlington on June 26th, 2010. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
Received: 06/26/10 ETR No: 137913			
833826	GRID #1	06/25/10	SOIL
833827	GRID #1 REP #1	06/25/10	SOIL
833828	GRID #1 REP #2	06/25/10	SOIL
833829	GRID #2	06/25/10	SOIL
833830	GRID #3	06/25/10	SOIL

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

After their receipt at the Burlington laboratory, the samples in this delivery group were air dried, processed through a sieve, then spread out for removal of Incremental Sub-samples. The sub-samples were not ground in a Puck Mill for due to concerns over the loss of Chlorate. The sub-samples were sent to the TestAmerica laboratory in Irvine California to be analyzed for Chlorate. The results of those analyses are filed in their entirety after this cover letter.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.



If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

A handwritten signature in black ink, appearing to read "Jim Madison". The signature is fluid and cursive, written over a light gray rectangular background.

Jim Madison
Project Manager

cc: Jo-Anne Palmer
Environmental Compliance and Sustainability Specialist
Environmental & Readiness Center
1203 West Inner Road
Camp Edwards, MA

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17661 Deiran Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax: (949) 260-3297

LABORATORY REPORT

Prepared For: TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Attention: Jim Madison

Project: MMR Site
EM627

Sampled: 06/25/10
Receive: 07/01/10
Issued: 07/13/10 12:22

NELAP #01108CA California ELAP#2706 Arizona DHS#AZ0671 Nevada #CA-72

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain of Custody, 1 page, is included and is an integral part of this report.

This entire report was reviewed and approved for release.

SAMPLE CROSS REFERENCE

LABORATORY ID	CLIENT ID	MATRIX
ITG0052-01	GRID #1	Soil
ITG0052-02	GRID #1 REP #1	Soil
ITG0052-03	GRID #1 REP #2	Soil
ITG0052-04	GRID #2	Soil
ITG0052-05	GRID #3	Soil

Reviewed By:



TestAmerica Irvine
Steven Garcia
Project Manager

ITG0052 <Page 1 of 4>

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax (949) 266-3297

TestAmerica Burlington 30 Community Drive, Suite 11 South Burlington, VT 05403 Attention: Jim Madison	Project ID: MMR Site EM627 Report Number: ITG0052	Sampled: 06/25/10 Received: 07/01/10
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INORGANICS (EPA 300.1)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: ITG0052-01 (GRID #1 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10G1161	200	ND	1	7/12/2010	7/12/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				99 %				
Sample ID: ITG0052-02 (GRID #1 REP #1 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10G1161	200	ND	1	7/12/2010	7/12/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				96 %				
Sample ID: ITG0052-03 (GRID #1 REP #2 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10G1161	200	ND	1	7/12/2010	7/12/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				101 %				
Sample ID: ITG0052-04 (GRID #2 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10G1161	200	ND	1	7/12/2010	7/12/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				101 %				
Sample ID: ITG0052-05 (GRID #3 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10G1161	200	ND	1	7/12/2010	7/12/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				99 %				

TestAmerica Irvine
Steven Garcia
Project Manager

The results pertain only to the samples tested in the laboratory. This report shall not be reproduced except in full, without written permission from TestAmerica. ITG0052 <Page 2 of 4>

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Doran Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax (949) 260-3297

TestAmerica Burlington 30 Community Drive, Suite 11 South Burlington, VT 05403 Attention: Jim Madison	Project ID: MMR Site EM627 Report Number: ITG0052	Sampled: 06/25/10 Received: 07/01/10
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METHOD BLANK/QC DATA

INORGANICS (EPA 300.1)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 10G1161 Extracted: 07/12/10										
Blank Analyzed: 07/12/2010 (10G1161-BLK1)										
Chlorate	ND	200	ug/kg							
Surrogate: Dichloroacetate (DCA)	9.89		ug/kg	10.0		99	90-115			
LCS Analyzed: 07/12/2010 (10G1161-BS1)										
Chlorate	938	200	ug/kg	1000		94	75-125			
Surrogate: Dichloroacetate (DCA)	9.81		ug/kg	10.0		98	90-115			
Matrix Spike Analyzed: 07/12/2010 (10G1161-MS1)										
Chlorate	992	200	ug/kg	1000	ND	99	75-125			
Surrogate: Dichloroacetate (DCA)	9.93		ug/kg	10.0		99	90-115			
Matrix Spike Dup Analyzed: 07/12/2010 (10G1161-MSD1)										
Chlorate	975	200	ug/kg	1000	ND	98	75-125	2	25	
Surrogate: Dichloroacetate (DCA)	9.85		ug/kg	10.0		99	90-115			

TestAmerica Irvine
Steven Garcia
Project Manager

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ITG0052 <Page 3 of 4>

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax (949) 260-3297

TestAmerica Burlington 30 Community Drive, Suite 11 South Burlington, VT 05403 Attention: Jim Madison	Project ID: MMR Site EM627 Report Number: ITG0052	Sampled: 06/25/10 Received: 07/01/10
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DATA QUALIFIERS AND DEFINITIONS

ND	Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.
RPD	Relative Percent Difference

TestAmerica Irvine
Steven Garcia
Project Manager

The results pertain only to the samples tested in the laboratory. This report shall not be reproduced except in full, without written permission from TestAmerica. ITG0052 <Page 4 of 4>

M116A1 Hand Grenade Simulator Final Summary Report

Rev. 31 May 2012

Intercompany Chain of Custody

2007 Job Reference: EM927
PO Reference: EM927
Project ID: ECCMARI
Project Name: AMRI Line
Due Date: 6/14/10

Burlington
30 Commonwealth Drive, Suite 11
South Burlington, VT 05403
Tel: 802 885-1990 Fax: 802 885-1999

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ITG0052

	Client Sample ID	Lab Sample ID	Matrix	Date Sampled	Time Sampled	
1	GRID #1	833826	SOIL	06/25/10	1128	X
2	GRID #1 REP #1	833827	SOIL	06/25/10	1128	X
3	GRID #1 REP #2	833828	SOIL	06/25/10	1128	X
4	GRID #2	833829	SOIL	06/25/10	1155	X
5	GRID #3	833830	SOIL	06/25/10	1215	X

Chlorate by 300.1

15:26
7/1/10
AP

Relinquished by: J. Muel Date: 6/30/10 Time: 1600
Received by: [Signature] Date: 7/1/10 Time: 1638
Initials: AP 410 412

8330B Puck Mill Grind Sample Preparation

SDG
FM027

ETR
137613

Client Code
ECOGRO

Analyst
SAF

Date	Time	Temp (°C)
6/26/2010	11:00	20.5
6/26/2010	7:15	20.0
6/26/2010	7:30	20.5

SAMPLE #	TRAY#1-F (g)	TRAY#2-F (g)	TRAY#1WET (g)	TRAY#2WET (g)	TRAY#1DRY REP A (g)	TRAY#1DRY REP B (g)	TRAY#2DRY REP A (g)	TRAY#2DRY REP B (g)	Mass >2mm (g)	Mass <2mm (g)	Total Dry Sample Mass (g)	>2mm
833626	1355		1659		1652	1650			29	267	295	9.5%
833627	1352		1719		1706	1705			48	306	354	13.6%
833628	1366		1686		1674	1674			31	297	315	9.7%
833629	1350		1692		1846	1844			54	440	494	10.9%
833630	1351		1969		1951	1959			51	957	808	8.4%

SAMPLE #	Mass-Grind (g)	Mass-CAP	#GRINDS	GRIND SIZE (g)	GRIND DATE	BOWL ID	GRIND BLANK ID
833626	257	0.44	1	257			Dry, Sieve, MIS, No Grind
833627	356	0.50	1	306			Dry, Sieve, MIS, No Grind
833628	267	0.47	1	267			Dry, Sieve, MIS, No Grind
833629	440	0.72	1	440			Dry, Sieve, MIS, No Grind
833630	957	0.91	1	957			Dry, Sieve, MIS, No Grind

FRACTION	BG/AG
Met	NA
11g	NA
850A	NA
8330	NA
8850	NA
TOC	NA

BG = Before Grind
AG = After Grind
NA = Not Applicable

TestAmerica Burlington

6/30/2010



July 21, 2010

Ms. Laurie Ekes
Environmental Chemical Corp.
PB 519 Gaffney Road
Otis ANGB, MA 2542

Re: Laboratory Project No. 29000
Case: 29000; SDG: AM515

Dear Ms. Ekes:

Enclosed are the analytical results for the samples that were received by TestAmerica Burlington on June 22nd, 2010. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
Received: 06/22/10 ETR No: 137846			
833364	CP2-01	06/04/10	SOIL
833365	CP2-02	06/04/10	SOIL
833366	CP2-03	06/04/10	SOIL

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

After their receipt at the Burlington laboratory, the samples in this delivery group were sent to the TestAmerica laboratory in Irvine California to be analyzed for Chlorate. The results of those analyses are filed in their entirety after this cover letter.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.



If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

A handwritten signature in black ink, appearing to read "Jim Madison". The signature is fluid and cursive, written over a light gray rectangular background.

Jim Madison
Project Manager

cc: Jo-Anne Palmer
Environmental Compliance and Sustainability Specialist
Environmental & Readiness Center
1203 West Inner Road
Camp Edwards, MA

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax: (949) 260-3297

LABORATORY REPORT

Prepared For: TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Attention: Joe Carabillo

Project: MMR Site

Sampled: 06/04/10
Received: 06/23/10
Issued: 07/02/10 16:41

NELAP #01108CA California ELAP#2706 Arizona DHS#AZ0671 Nevada #CA-72

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of TestAmerica and its client. This report shall not be reproduced, except in full, without written permission from TestAmerica. The Chain(s) of Custody, 2 pages, are included and are an integral part of this report.

This entire report was reviewed and approved for release.

SAMPLE CROSS REFERENCE

LABORATORY ID	CLIENT ID	MATRIX
ITF2221-01	CP2-01	Soil
ITF2221-02	CP2-02	Soil
ITF2221-03	CP2-03	Soil

Reviewed By:



TestAmerica Irvine
Steven Garcia
Project Manager

ITF2221 <Page 1 of 4>

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax (949) 260-3297

TestAmerica Burlington 30 Community Drive, Suite 11 South Burlington, VT 05403 Attention: Joe Carabillo	Project ID: MMR Site Report Number: ITF2221	Sampled: 06/04/10 Received: 06/23/10
--	--	---

INORGANICS (EPA 300.1)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: ITF2221-01 (CP2-01 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10F3725	200	ND	1	6/30/2010	6/30/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				103 %				
Sample ID: ITF2221-02 (CP2-02 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10F3725	200	ND	1	6/30/2010	6/30/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				102 %				
Sample ID: ITF2221-03 (CP2-03 - Soil)								
Reporting Units: ug/kg								
Chlorate	EPA 300.1 Mod.	10F3725	200	ND	1	6/30/2010	6/30/2010	
Surrogate: Dichloroacetate (DCA) (90-115%)				102 %				

TestAmerica Irvine

Steven Garcia
Project Manager

The results pertain only to the samples tested in the laboratory. This report shall not be reproduced except in full, without written permission from TestAmerica. ITF2221 <Page 2 of 4>

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Denair Avenue Suite 100, Irvine, CA 92614 (949) 261-1022 Fax (949) 260-5297

TestAmerica Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403
Attention: Joe Caraballo

Project ID: MMR Site
Report Number: ITF2221

Sampled: 06/04/10
Received: 06/23/10

METHOD BLANK/QC DATA

INORGANICS (EPA 300.1)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	Limits	RPD	Limit	Data Qualifiers
Batch: 10F3725 Extracted: 06/30/10										
Blank Analyzed: 06/30/2010 (10F3725-BLK1)										
Chlorate	ND	200	ug/kg							
Surrogate: Dichloroacetate (DCA)	10.4		ug/kg	10.0		104	90-115			
LCS Analyzed: 06/30/2010 (10F3725-BS1)										
Chlorate	1000	200	ug/kg	1000		100	75-125			
Surrogate: Dichloroacetate (DCA)	10.3		ug/kg	10.0		103	90-115			
Matrix Spike Analyzed: 06/30/2010 (10F3725-MS1)										
Chlorate	881	200	ug/kg	1000	ND	88	75-125			
Surrogate: Dichloroacetate (DCA)	10.2		ug/kg	10.0		102	90-115			
Matrix Spike Dup Analyzed: 06/30/2010 (10F3725-MSD1)										
Chlorate	883	200	ug/kg	1000	ND	88	75-125	0.2	25	
Surrogate: Dichloroacetate (DCA)	10.4		ug/kg	10.0		104	90-115			

TestAmerica Irvine
Steven Garcia
Project Manager

The results pertain only to the samples tested in the laboratory. This report shall not be reproduced except in full, without written permission from TestAmerica. ITF2221 <Page 3 of 4>

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

17461 Derian Avenue, Suite 100, Irvine, CA 92614 (949) 261-1022 Fax (949) 260-3297

TestAmerica Burlington 30 Community Drive, Suite 11 South Burlington, VT 05403 Attention: Joe Caraballo	Project ID: MMR Site Report Number: ITF2221	Sampled: 06/04/10 Received: 06/23/10
--	--	---

DATA QUALIFIERS AND DEFINITIONS

ND	Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.
RPD	Relative Percent Difference

TestAmerica Irvine
Steven Garcia
Project Manager

The results pertain only to the samples tested in the laboratory. This report shall not be reproduced except in full, without written permission from TestAmerica. ITF2221 <Page 4 of 4>

M116A1 Hand Grenade Simulator Final Summary Report

Rev. 31 May 2012

Intercompany Chain of Custody

SOI Job Reference: AM915
 PO Reference: AM915
 Project ID: ECCOMAR
 Project Name: MMR Site
 Due Date: 07/01/10

Burlington
 50 Community Drive, Suite 11
 South Burlington, VT 05403
 Tel: 802 660-1900 Fax: 802 660-1918

ITF2221

TestAmerica
 THE LEADER IN ENVIRONMENTAL TESTING

	Client Sample ID	Lab Sample ID	Matrix	Date Sampled	Time Sampled	
1	CP2-01	833364	SOIL	06/04/10	1125	X
2	CP2-02	833365	SOIL	06/04/10	1128	X
3	CP2-03	833366	SOIL	06/04/10	1131	X

Chlorate by 300.1

00
 6/24/10
 15:15

Retrieved By:  Date: 6/22/10 Time: 1450 Retrieved By: Brian Fulton Date: 6/22/10 Time: 10:35

*1A18

2-18

(85)

313

Appendix D

Camp Edwards, Range Control, M116A1 Hand Grenade Simulator

Standard Operating Procedure

M116A1 Hand Grenade Simulator SOP

Pyrotechnic Simulator
M116A1 Hand Grenade DODIC L601
STANDARD OPERATING PROCEDURES (SOP)

Camp Edwards, Army National Guard Training Site,
Massachusetts National Guard

January 2012

1

40

M116A1 Hand Grenade Simulator SOP



REPLY TO

DEPARTMENT OF THE ARMY
MASSACHUSETTS ARMY NATIONAL GUARD TRAINING SITE
CAMP EDWARDS, MASSACHUSETTS 02542-5003

10 JAN 2012

NGMA-CPE-RC

Range Control Standard Operating Procedure (SOP)

HISTORY: This is the second publication of this SOP and supersedes the XCTC- 1003 Camp Edwards Pyrotechnic Hand Grenade Simulator M116A1 SOP.

SUMMARY: This SOP establishes policies, procedures, and guidelines governing the use and operation of the M116A1 Hand Grenade Simulator.

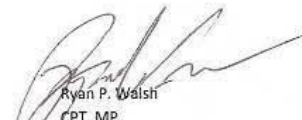
APPLICABILITY: This publication applies to all users of the M116A1 Hand Grenade Simulator to include the issuing and oversight of operations for Range Control employees.

PROPONENT AND EXCEPTION POLICY: Range Control Officer in Charge (OIC) is the proponent of this SOP, and has the authority to approve exceptions to this SOP that are consistent with safe training and environmental regulations.

DISTRIBUTION AND IMPLEMENTATION: Range Control OIC is responsible for the distribution and implementation of this SOP for all users and staff. All units requesting the use of the M116A1 Hand Grenade Simulators will familiarize themselves with this SOP.

SUGGESTED IMPROVEMENTS: Users are invited to provide comments and suggested improvements to this SOP directly to the Range Control OIC.

RESTRICTIONS: This SOP is for Range Control staff and user use only and is not to be distributed for public use.


 Ryan P. Walsh
 CPT, MP
 Range Control Officer

M116A1 Hand Grenade Simulator SOP

1.0 INTRODUCTION

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Appendix A	Utilization Report
Appendix B	Training Areas acceptance/clearance checklist
Appendix C	Map of restricted areas

M116A1 Hand Grenade Simulator SOP

1.0 Introduction

Camp Edwards continues to improve, upgrade, and maximize the bases' training effectiveness, efficiency, and realism while continuing to ensure sustainability of our training lands. The purpose of the M116A1 Hand Grenade Pyrotechnic Simulator is to increase battlefield realism by creating battle noises and flashes allowing Soldiers to prepare for possible situations in a deployed environment. With the addition of the Soldier Validation Lane (SVL), this simulator will greatly enhance Soldiers training on Counter-Improvised Explosive Device (C-IED) training. The new Pre-Mobilization mandatory training requirement consisting of; 15 Army Warrior Tasks (AWT) and 4 Battle Drills (BD), place an even stronger emphasis on utilizing local training areas and increasing their potential. Camp Edwards is the National Guards Local Training Area in New England and it provides us the ability to train our Soldiers on these AWT and BD while maximizing the limited time given as compared to active duty counterparts.

1.1 Purpose

The purpose of this Standard Operating Procedure (SOP) is to standardize procedures for units training with the M116A1 Hand Grenade Simulator at Camp Edwards Massachusetts Military Reservation (MMR). The plan will allow for maximum effective use of the hand grenade simulator while abiding by training and environmental guidelines. The M116A1 Hand Grenade Simulator will only be used at Camp Edwards with the approved SOP implemented.

1.2 Background

In May of 1997 the United States Environmental Protection Agency (USEPA) issued Administrative Order 2 (AO2) which suspended the use of all pyrotechnics at or near the training Range and Impact Area. In October of 2009, the MANG petition for a modification of AO2 to allow the use of the M116A1 Hand Grenade Simulator, DODIC L601, for training purposes. USEPA modified AO2 to allow a limited authorization to use one type of pyrotechnic device, the M116A1 Hand Grenade Simulator, for a two year period to commence the first day of use.

The Environmental Management Commission (EMC) also approved the use of the M116A1 Hand Grenade Simulator, under a two year pilot program.

Both the USEPA and EMC's approval are based on a number of conditions, which will be detailed in section 1.3 in this SOP.

1.3 Environmental Requirements

In order for the MAARNG to utilize the M116A1 Hand Grenade Simulator in the "reserve" portion, or Northern 15,000 acres of Camp Edwards, Appendix D to EPA Region I Administrative Order SDWA I-97-1030 and Massachusetts General Law Chapter 47 of the Acts of 2002 must be adhered to.

The following conditions must be met at a minimum;

- No more than 1000 of the pyrotechnic devices shall be used within a one year time period.
- All metal wires associated with the device will be turned-in as accountable dunnage.

M116A1 Hand Grenade Simulator SOP

- All simulated grenade use will be in accordance with the Environmental Performance Standards (EPS).
- Best Management Practices (BMPs) will be developed and employed to prevent or mitigate adverse impacts, including litter, from the grenade use.
- EMC's Executive Director will be notified prior to use through Camp Edwards Range Bulletin.

The Annual State of the Reservation Report's training section dedicated to the use of simulated munitions use shall include a section discussing the simulated grenade use, and monitoring, and relevant issues encountered during the applicable training year. The section shall include numbers of simulated grenades used, and training areas where they were used.

1.4 Roles and Responsibilities

To implement this SOP, Camp Edwards will require a team of leaders to manage training operations, facility maintenance, and environmental protection functions.

1.4.1 Training Site Commander

The Training Site Commander is responsible for the overall operation of Camp Edwards to include the immediate supervision, control, coordination, and safety of all Camp Edwards facilities and promotion of mission compatible and environmentally sustainable uses of Camp Edwards resources.

1.4.2 Director of Plans and Training

The Director of Plans and Training (DPT) is the primary advisor to the Training Site Commander on all matters concerning the safe, efficient utilization of Camp Edwards training facilities. Within the overall responsibility for Range Control operations, the DPT will:

- Provide review, comments, and approval of this individual SOP.
- Identify and program for range modernization, operations, and maintenance requirements based on training load and doctrine; and
- Include requirements within this SOP for planning and budgeting actions as appropriate for sustainable BMP's of ranges and training areas.

1.4.3 Range Control Officer

The Range Control Officer is the primary representative of the Training Site Commander at Range Control and, as such, will:

- Control access to ranges;
- Ensure that individuals identified as "throwers" received safety video from ASP.
- Conduct a Safety Danger Zone (SDZ) review for all M116A1 Simulated Grenade training events and proposed specific engagement areas prior to unit training events.
- Ensure that Grenade Simulators SDZ(s) for those events do not conflict with other units training in the area.

M116A1 Hand Grenade Simulator SOP

- Coordinate operation of simulators and oversee using units while training in Camp Edwards training area;
- Enforce applicable guidance and regulations, EPS's, SOPs, and safety requirements;
- Schedule and issue training areas to units and clear/close out units upon completion of training area use.
- Ensure upon completion of training, that all training areas and engagement areas have been policed of debris and brass.
- Conduct periodic inspections of training area conditions and identify requirements for repair and maintenance.

1.4.4 Environmental and Readiness Center

The Environmental and Readiness Center (E&RC) is the primary representative for the Training Site Commander for accomplishment of sustainable environmental management requirements.

1.4.5 Ammunition Supply Point

Camp Edwards Ammunition Supply Point (ASP) is responsible for the care and storage of all munitions on the training base. All pyrotechnic residues from the M116A1 Hand Grenade Simulator will be disposed of at the Camp Edwards Ammunition Supply Point (ASP). All pyrotechnic dunnage (i.e. plastic and string initiators, wire safeties) and shipping/packaging waste will be turned into the ASP.

- The ASP will ensure that all personnel identified as "throwers" are briefed on safety measures and are required to watch the M116A1 safety video.

1.4.6 Unit Commanders

Unit commanders will comply with TAGMA PAM 350-2, AR 385-63 Range Safety, DA PAM 385-63 for Unit Range Safety Certification program, installation guidance, applicable technical manuals, field manuals and all provisions in this SOP.

- Designate a trained Range Officer In Charge (OIC) and Range Safety Officer (RSO) for each training event and ensure they have a current certification from Camp Edwards Range Control.
 - Per DA PAM 385-63 the minimum grade requirement for hand grenade simulators; OIC E6 or above, RSO E5 or above.
- Conduct risk management for all Range Operations and complete a DA Form 7566 Composite Risk Management Worksheet, ensure that the unit provides a copy of the risk management worksheet to range control.
- Submit a copy of the DA-581 to RC to ensure that the correct hand grenade simulator (DODIC 1601, M116A1 Hand Grenade Simulator Manufactured after JAN 2009) is utilized on Camp Edwards.
- All training request must be submitted using RFMSS NLT 90 days out from training event, and ensure that request has been approved prior to arrival.
- Submit Map Overlay; 1:25,000 scale with clearly defined deployment area(s), 14 days prior to training event for approval.
- For convoy training include separate convoy route overlay, expect if the C-IED lane is being used as the convoy route, 14 days prior to training event.

M116A1 Hand Grenade Simulator SOP

1.4.7 Training Event OIC

The unit appointed training OIC is responsible for the overall safety and use of the hand grenade simulators for that specific unit while conducting training on Camp Edwards.

- Account for the location of each M116A1 hand grenade simulator used within the training lane.
- Usage will be accounted for using the Training Utilization Report.
- Ensure that Map overlay's are submitted to Range Control prior to training.
- Any change in location of usage, as annotated in map overlay, and with the approval of Range Control will be tracked using the Camp Edwards Training Site MAP, issued upon check in at RC. Indicate the number of hand grenade simulations used and location.
- Ensure the utilization of Proper Protective Equipment (PPE) for participants and observers.
- Ensure that a Surface Danger Zone (SDZ) of 30 meters is established before deployment of simulator.
- Ensure training area is cleared and all dunnage, residues, and metal wires associated with the M116A1 hand grenade simulator are turned-in to ASP upon completion of training.
- Ensure all that all training specific requirements in this SOP are adhered to.

2.0 Range Operations

This section covers Range Controls duties and responsibilities in issuing and clearing training area's where the M116A1 hand grenade simulators are used. Range Control, under the Directorate of Plans and Training is responsible for the issue, clearance and safe utilization of all Camp Edwards training.

2.1 Range Scheduling

Per TAGMA PAM 350-2, Range Control schedules training usage based upon written input received from using units. Units use the Range Facility Management Support System (RFMSS), at <https://rfmss.belvoir.army.mil> to schedule training, stating the dates and facility desired. The request must include the anticipated number of soldiers or other users occupying and using the range, the types of weapons to be used, the types of ammunition to be used (by DoD Identification Code [DODIC]), and estimated amounts of ammunition and or pyrotechnics to be expended. A master schedule is available for viewing electronically via the RFMSS Program. To avoid conflicts, co-use of a previously scheduled area will be confirmed only after Camp Edwards Operations and Range Control receive a written consent from the originally scheduled unit.

Units schedule only the days that they will be training, not the day they intend to draw and occupy. Units schedule their anticipated training time, not the default 0000-2359 hrs. Units can modify their training request through RFMSS, but must call Range Control Operations to cancel and follow up with written confirmation by emailing ma-range@ng.army.mil (Camp Edwards Range Control in the global address book).

2.2 Issuing and Clearing of Training Area

A unit representative will sign out the training area from Range Control prior to occupation or use. Units must confirm the information provided at the time the range was scheduled (e.g., numbers of users,

M116A1 Hand Grenade Simulator SOP

vehicles, location of training, location of deployment of grenade simulators). Each unit will receive a training area usage packet, Training Facility Utilization Report (appendix A) , Training area acceptance/clearance checklist (appendix B) , Camp Edwards Training Site Map (Identify location of denotations, Appendix C), and a 5 gallon bucket for pyrotechnic residue.

Before training can begin, the unit must provide Range Control with a Map overlay of the proposed denotation location and a copy of the DA 581. Any change to employment areas as outlined in the map overlay needs prior approval from Range Control. Units will use the Camp Edwards Training Site MAP, issued at check in, to annotate new employment locations. This map will then be turned in to Range Control after training event. Prior to occupation, or immediately thereafter, the unit NCOIC and/or OIC will inspect the training area and report any deficiencies immediately to Range Control. If no deficiencies are reported, then any deficiencies found in that training area when clearing will be the unit's responsibility to clear.

Prior to drawing any training area the unit must have a current certified unit OIC, RSO and Environmental Officer. All certifications are kept on file at Range Control and need to be updated annually. Contact Camp Edwards Range Control IOT schedule annual re-certification training. Range Control personnel will conduct safety, environmental and trespassing awareness briefings to designated OICs and RSOs prior to issuing the training area.

Once training is completed, the unit inspects the training area to ensure that all residue, trash and unit equipment is cleared. The training area is not considered cleared until Range Control personnel visibly inspects and clears the training area and signs the training area acceptance/clearance checklist. The unit representative will report to Range Control returning the Range packets, utilization form, Map identifying where the grenade simulators were deployed, and any equipment issued. Ensure all pyrotechnic dunnage is turned into the ASP.

2.2.1 Special Police Requirements

All pyrotechnic residues from the M116A1 Hand Grenade Simulator will be disposed of at the Camp Edwards ASP. If the device is hollowed out (i.e. the device end caps have blow out, with a cardboard tube intact) it is considered pyrotechnic residue and must be crushed, shredded, and /or destroyed so that it cannot be identified or reused as an expedient explosive device.

Throwers are responsible to observe/ account for the correct functioning of the pyrotechnic hand grenade simulator to ensure that DUD devices are not mistakenly brought to the ASP. Designated receptacles' (5 gallon buckets) for the M116A1 Hand Grenade Simulator will be used for pyrotechnic residue. When all training is complete these receptacles' will be returned to Range Control.

2.2.2 Restrictions and Limitations

All proposed training events will be requested through RFMSS not later than 90 days prior to the training event. As a minimum the training request will include the following information:

- Unit(s) requesting the event.
- Date of event, include starting and ending times.

M116A1 Hand Grenade Simulator SOP

- Description of the training event and number of troops.
- Map Overlay; 1:25,000 scale with clearly defined deployment area(s), 14 days prior to training event.
- For convoy training include separate convoy route overlay, expect if the C-IED lane is being used as the convoy route, 14 days prior to training event.

The M116A1 hand grenade simulators are approved to be used in the Northern training area except for the following:

- Pyrotechnics will not be used within any wetlands or in any body of water. A 50 meter buffer zone will be used around wetlands and bodies of water.
- Pyrotechnics will not be used within 400 feet of a public water well.
- Pyrotechnics will not be used within 500 feet of a residential area. (i.e. portions of Greenway and Canal View roads)
- During times of increased fire hazard conditions, Range Control may temporally restrict pyrotechnic use until fire hazard conditions improve. However, use may be restricted to designated points (i.e. pits, steel drums) in clear un-vegetated areas during increased fire hazard conditions.
- Quantities of greater than 1000 M116A1 Hand Grenade Simulators will not be used within a 1 acre area per year. Range Control will use the Utilization Report s to track total usage and advise units where pyrotechnic hand grenade simulators may be used.
- See attached Map of Camp Edwards wetlands, water bodies and wells (Annex C).

3.0 Safety

Safety is the primary concern when conducting any training on Camp Edwards. Safety is the primary responsibility of every leader down to the smallest element. Reference: DA PAM 385-63, AR 385-63, AR 385-10, DA PAM 385-10 and TAGMA PAM 350-2. Units are required to appoint a Range Safety Officer (RSO) for every training event. Unit commanders must provide written documentation of appointment by using either the Camp Edwards RSO form or memorandum of record. Per DA PAM 385-63 the minimum grade requirement for a hand grenade simulator RSO is an E5.

The RSO is responsible for reporting all accidents no matter how minor in nature. All accidents will be immediately reported to Range Control who will then contact appropriate personnel. All incidents will require the RSO to fill out a Camp Edwards Incident Report form which will be issued by Range Control once the incident is reported.

Commanders are required by DA PAM 385-63 to conduct risk management for all range operations. For all Range Operations, the unit must complete a DA Form 7566 Composite Risk Management Worksheet; ensure that a signed copy of the risk management worksheet is provided to range control prior to training. The unit commander is responsible for the overall safety of the units training event. A designated unit RSO will be identified prior the training and use of the M116A1 hand grenade simulator. Only the M116A1 hand grenade simulators (DODIC L601) manufactured after JAN 2009 will be utilized on Camp Edwards. The following safety measures must be implemented:

- Ensure that a SDZ of 30 meters has been established.

M116A1 Hand Grenade Simulator SOP

- Ensure that when a simulator is initiated, it must be immediately thrown in a direction away from unprotected personnel THERE IS NO WARNING WHISTLE for M116A1 DO NOT "COOK OFF" pyrotechnic hand grenade simulators.
- These devices shall not be activated in loose gravel, debris, or other materials that are subject to projection. Also they should not be thrown into dry leaves, grass, or other flammables.
- Restrict use and handling of simulators to designated, authorized Personnel. Personnel shall be limited to experienced, thoroughly trained Combat trainers/controllers who have been briefed on potential hazards of these items including and especially 30 meter SDZ.
- Observe SDZ for unprotected personnel at all times. SDZ distances less than 30 meters are only acceptable for protected personnel. Protected personnel are those protected by suitable cover, such as armored vehicles, buildings, or dug-in emplacements etc. Furthermore, personnel are normally considered protected when simulator detonations are separated from personnel by masking terrain or within designated barricaded areas and/or pits. Combat trainers/controllers shall work directly with local safety and QASAS personnel to evaluate, design, and/or approve locations on the training range for simulator use.

In accordance with TM 9-1370-207-10 (Pyrotechnic Simulator Operator's Manual) do not handle duds. Mark the location and notify Range Control and wait one hour. Range Control will notify appropriate EOD personnel for response. Ensure that the simulator is clearly marked and that a safe standoff distance of 30 meters is implemented.

3.1 Proper Protective Equipment

A full complement of Proper Protective Equipment (PPE) is mandatory to exercise hand grenade simulation training. Commanders will be required to ensure that Soldiers are wearing the proper PPE prior to deployment of any grenade simulators. Soldiers not following proper PPE requirements increase the opportunity for serious injury or impairment. Commanders can upgrade the required PPE pertaining to individual M116A1 hand grenade training, but cannot remove from the standard. The basic equipment is as follows:

Throwers: personnel designated and authorized to use simulators shall follow precautions and warnings below. When using M116A1 Simulators, thrower shall wear:

- Standard-issue leather glove on throwing hand
- Safety eyewear (e.g. "gargoyle" eyewear or safety glasses).
- Thrower shall also seek suitable cover/barricade, turn away from simulator point of detonation and assume protective stance after throwing. Thrower shall also assure simulator is thrown at least 30 meters from unprotected personnel.

Additional specific M116A1 hand grenade simulator thrower guidance:

- Will be employed only from behind suitable cover/barricade.
- Hearing protection (as required based on thrower proximity to detonation area).
- Pyrotechnics will not be thrown from a building or vehicle.
- Pyrotechnics will not be thrown into a building or vehicle.

Trainee's specific personnel protection requirements exposed to M116A1 effects:

10

50

M116A1 Hand Grenade Simulator SOP

- Safety eyewear (IAW APEL).
- Kevlar helmet
- Body armor (SAPI plates are not required)

Exposed or target personnel who are not under cover shall be instructed to follow current doctrine for action normally taken when exposed in combat.

M116A1 Hand Grenade Simulator (DODIC L601) Manufactured after January 2009 is the only authorized hand grenade simulator to be used on Camp Edwards.



M116A1 Hand Grenade Simulator SOP

CAMP EDWARDS TRAINING FACILITY UTILIZATION REPORT (Appendix A)

(This form will be completed by all units/ organizations conducting training at Camp Edwards IAW CE Reg 385-63, AUG 2006. Return form to Range Control upon completion of training.) Appendix A

UNIT:		UIC:		COMPONENT:	
ADDRESS:			DATE OF TRAINING:		
POC CONTACT NUMBERS		DSN:		CELL:	
NAME/ RANK / LAST 4 RANGE OIC:			NAME/ RANK / LAST 4 RANGE RSO:		
NUMBER OF PERSONNEL TRAINED:		RANGE HOT TIME:		RANGE COLD TIME:	
FIRING LANES USED DURING TRAINING (circle the lanes used): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29					
WEAPONS SYSTEMS:		TYPE OF AMMUNITION:		NUMBER EXPENDED:	
VEHICLES BY TYPE PRESENT ON RANGE:				QTY:	
BIVOUAC AREA USED:		NUMBER of PERSONNEL:		NUMBER of NIGHTS:	
TYPES OF EXERCISES CONDUCTED:					
AAR COMMENTS:					
SIGNATURE OF RANGE OIC/ RSO:					
DATE:					

M116A1 Hand Grenade Simulator SOP

Camp Edwards Range Control

Training Area Acceptance/Clearance Checklist (Appendix B)

(The "Pre" section of form is to be completed by the using unit. Camp Edwards Range Control personnel with a using unit representative will complete the "Post" Section)

A. Administrative Data					
Facility:				Issue DATE:	
				Clearance DATE:	
Range Control Inspector:					
Unit Representative :				UNIT:	
B. Training Area Inspection					
	Pre Inspection		Post Inspection		DEFICIENCIES Note if deficiency was found Pre or Post Inspection
	SAT	UNSAT	SAT	UNSAT	
Road entering the area have been policed and barricades removed					
Parking Area/other POL use areas (POL leaks or stains)					
Trees and other vegetation have not been cut					
Foxholes have not been created w/o RC authorization					
Grass area's (Trash, cleanliness)					
No indication of Hazardous Materials or solid waste					
Wood Line (Trash, cleanliness)					
Concertina wire, Class IV and training materials have been removed from area					
Brass and debris from UTM, Blank fire, and M116A1 grenade simulator has been policed					
*Connex windows and doors are secured. (SVL Lane)					
NOTE: All UNSAT conditions must have deficiencies comment. Use N/A if not applicable. If deficiencies require maintenance then ensure copy of this inspection is giving to fire desk IOT notify maintenance of requirements.					
C. Signatures					
Range Control Inspector:				Unit Observer:	

**APPENDIX H:
SOLDIER VALIDATION LANE
ANNUAL REPORT**

Camp Edwards Soldier Validation Lane Yearly Monitoring Report

Container Placement

Container placement for Soldier Validation lanes was done in accordance with the Container Placement Checklist and the conditions provided by Natural Heritage Endangered Species Program to prevent a “take” of state-listed species. Figure 1 displays the location of all Soldier Validation Lanes placed in the training area during FY2012. Table 1 below provides a summary of the number, locations, and dates of container placement as well as any cutting or leveling conducted for container placement. All maneuver activities associated with the lanes were limited to established roads, road shoulders, and roadways within the power line right of ways. For containers placed in October and November 2011, containers were placed in either unvegetated or mowed areas mitigating any risks to the Eastern Box turtle. In addition, Natural Resources staff was also present daily on site and verified placement areas with contractors. In October, Annie Curtis, Natural Resource Planner (MS Natural Resources, 3 + years experience searching for state-listed turtle species), was on site for container placement as the Natural Resource Manager was out for medical reasons. In November, the Natural Resource Manager resumed this duty. Container placement was also coordinated with Mark Begley, the Environmental Management Commission Executive Director.

Table 1. Summary of number of containers, dates of placement, and work completed on Soldier Validation Lanes at Camp Edwards, MA.

Soldier Validation Lane	Number of containers	Dates of Container Placement	Cutting or filling performed for container placement
OBJ 1 (SVL 6)	18	December 2011	Minor grading done for two placements impacting less than the top 2” of soil
OBJ 2 (SVL 1, 3, 4)	32	October and December 2011	Mowing of road shoulder on Pew Road, cutting small pitch pine (<3" diameter) encroaching on fence at SVL 3, minor leveling to place containers on railroad ties along Pew Road
OBJ 3 (SVL 21)	5	November and December 2011	None
OBJ 4 (SVL 17)	4	November and December 2011	Mowing of open areas

SVL Assessment After FY12 Training Season

In the fall of 2012, the Natural Resource Office performed an assessment of the Soldier Validation Lane sites used for training in FY12. The assessment methodology was coordinated with the Environmental Management Commission Executive Director and matched the assessment performed in the Baseline Condition Assessment Report to provide a means of comparison. For all sites, the percent covers for each vegetative layer (trees, shrubs, herbaceous, and bare) were similar for before (as recorded in the Baseline Condition Assessment Report) and after use as an SVL, except at SVL4, where the amount of herbaceous cover actually increased after training had occurred, and at SVL 21 where the amount of herbaceous cover decreased after training. The decrease at SVL 21 of herbaceous cover is most likely attributed to its being surveyed in late October when herbaceous cover naturally decreases. Similar amounts of erosion/rutting were noted at each site before and after training. At SVL 1, the amount of erosion noted in the post assessment was less than the baseline condition survey (due to work performed to improve the site for training use). At several sites, existing material piles were incorporated into the SVL as a training tool. At three of the lanes, some of the material piles had been removed to prepare the lane for use. At SVL 1, an existing water tower was also righted and incorporated into the lane. At SVL 6, tree scarring killed one pitch pine tree.

Conclusion

All regulatory conditions were followed in the placement of containers and during use of the SVLs for training. The condition of the lanes after the training season was generally in comparable or better condition than the baseline condition surveys. Negative impacts included one dead tree. Positive impacts included improvements to eroded areas and the removal of material piles. The MAARNG will continue to strive to minimize environmental impacts from these lanes by following the established guidelines.

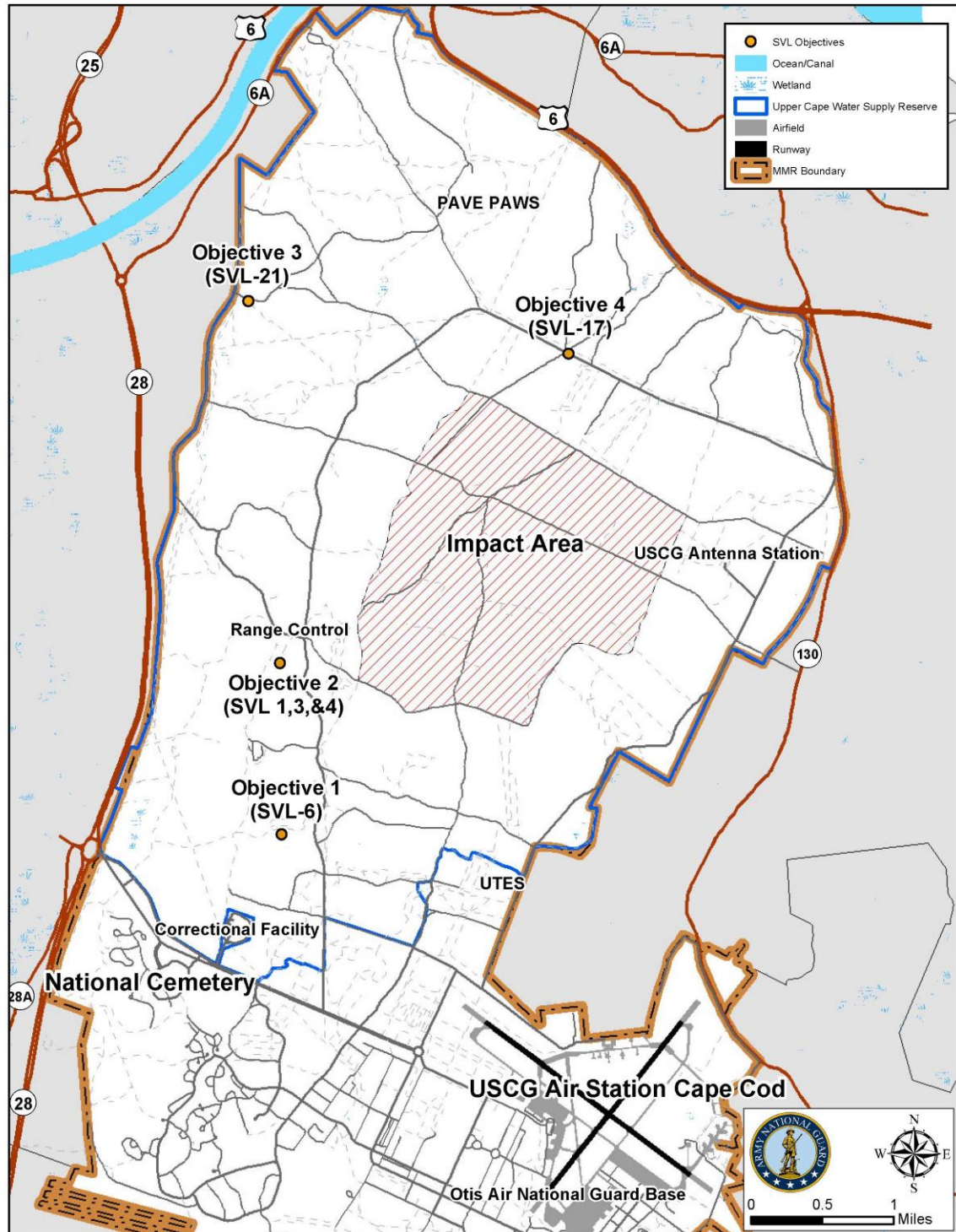


Figure 1: Soldier Validation Lane Locations, FY 2012

Appendix A:
Fall 2012 SVL Assessment:
Datasheets and Photographs

Massachusetts Military Reservation - Soldier Validation Lane Post Assessment of Container Locations

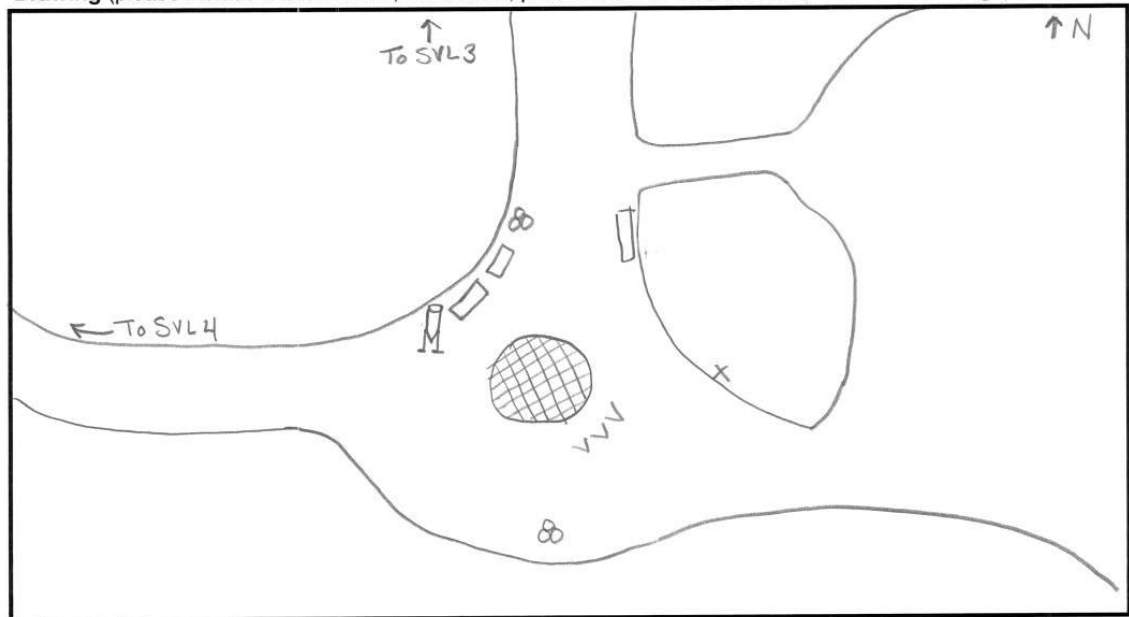
Site SVL1 - BA4 Assessors S. Poverty Date 9/18/2012

Damage	Description
☐ Tree scarring	<u>Egress/Ingress: 4</u>
☒ Standing deadwood	<u>Containers: 8</u>
☐ Felled trees	
☐ Brush piles	
☒ Erosion	<u>minor erosion due to such sandy soil</u>
☐ Ditching/rutting	
☐ Trash	
☐ Spills	
☒ Material piles	<u>Rock pile & concrete pile</u>
☐ Other	

Percent Cover	Dominant Species
<u>5</u> Trees	<u>Pinus rigida</u>
<u>0</u> Shrubs	
<u>10</u> Herbaceous	<u>Festuca rubra, Carex rugosperma, Hypericum gentianoides</u>
<u>85</u> Bare	<u>sand, compact soil, gravel</u>

Any improvements made for training?

Drawing (please include a north arrow, landmarks, photo locations and direction, location of damage)



= jersey barrier rotary
 = container
 = material pile

= green water tower
 = erosion/rutting
 = standing dead tree



Figure 1. View facing north at SVL 1



Figure 1. View facing east at south end of SVL 1



Figure 2. View facing west at south end of SVL 1



Figure 3. View facing south of material pile at SVL 1



Figure 4. View facing north of material pile at SVL 1



Figure 6. View facing northwest of minor rutting at SVL 1



Figure 7. View facing west of standing dead tree at SVL 1

Massachusetts Military Reservation - Soldier Validation Lane Post Assessment of Container Locations

Site SVL3-BA4 Assessors S. Paventy Date 9/18/2012

Damage	Description
Tree scarring	Ingress/Egress: 2
Standing deadwood	Containers: 10
✓ Felled trees	Felled trees around fencing (stump evidence)
Brush piles	
Erosion	
✓ Ditching/rutting	Minor rutting at south egress
✓ Trash	
Spills	
✓ Material piles	Mulch pile at north entrance; 4x4's; bar pile to south; cement slabs (broken)
✓ Other	Bleachers in northeast corner w/ boards for signage; area enclosed in chain-link fence; electrical box to north; cement barriers through out;
Percent Cover	Dominant Species
1 Trees	Pinus rigida
1 Shrubs	Prunus serotina, Eleagnus umbellata
5 Herbaceous	Asclepias spp., Festuca rubra
93 Bare	asphalt; gravel

Any improvements made for training?

Drawing (please include a north arrow, landmarks, photo locations and direction, location of damage)

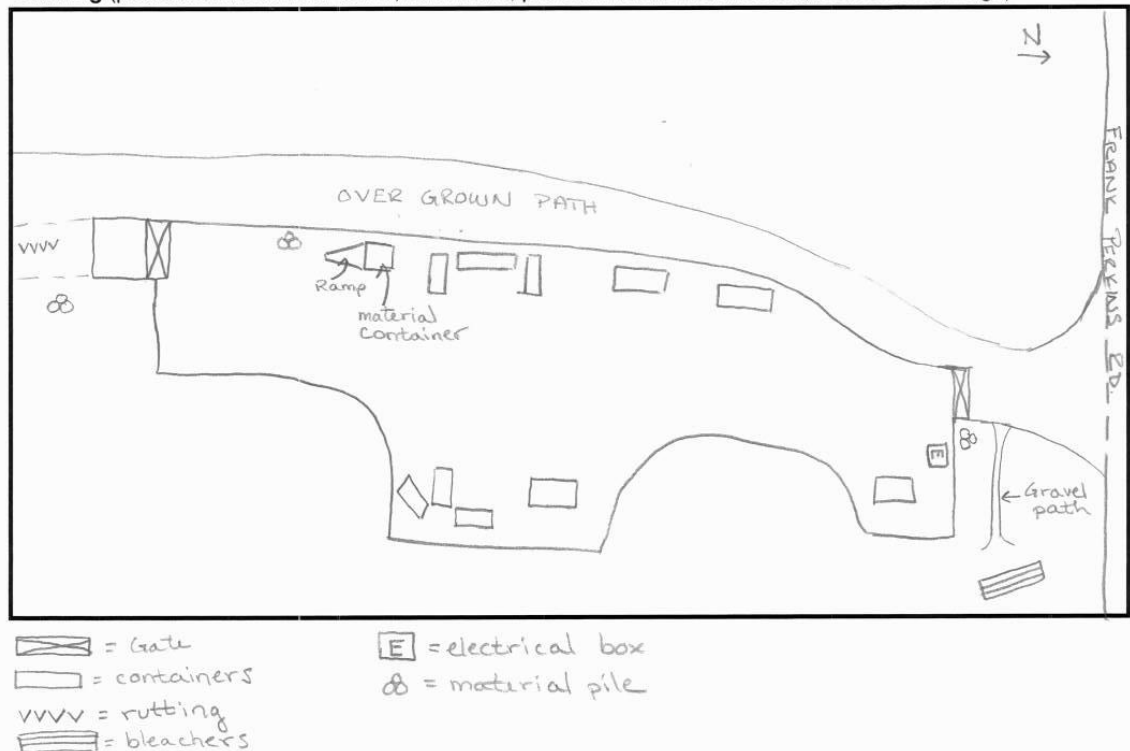




Figure 5. View facing west of bleachers and sign kiosks at SVL 3



Figure 6. View of conex containers and market simulation at SVL 3



Figure 7. View facing northeast from the western border of SVL 3 showing conex containers



Figure 8. View facing north from the southern ingress/egress of SVL 3



Figure 5. Small tree cutting along the fence surrounding SVL 3



Figure 6. A material pile of 4x4 beams on the western side of SVL 3



Figure 7. Material pile of broken tar against the chain-link fence on the west side of SVL 3



Figure 8. Material pile of mulch at the north end of SVL 3



Figure 9. View facing south from the southern ingress/egress of SVL 3. Note the beginning of minor rutting.

Massachusetts Military Reservation - Soldier Validation Lane Post Assessment of Container Locations

Site SVL 4-BAY Assessors S. Paverty Date 9/18/2012

Damage	Description
☒ Tree scarring	<u>minor tree scarring (very little); Ingress/Egress: 8</u>
☒ Standing deadwood	<u>Containers: 11</u>
☐ Felled trees	
☐ Brush piles	
☒ Erosion	<u>Minor - wash out along road</u>
☒ Ditching/rutting	<u>minor rutting in road</u>
☐ Trash	
☐ Spills	
☒ Material piles	<u>Two piles of concrete</u>
☐ Other	

Percent Cover	Dominant Species
<u>10</u> Trees	<u>Quercus rubra, Pinus rigida</u>
<u>0</u> Shrubs	
<u>30</u> Herbaceous	<u>Festuca rubra, Euthamia galetanum</u>
<u>25</u> Bare	<u>compact soil, sand</u>

Any improvements made for training?

Drawing (please include a north arrow, landmarks, photo locations and direction, location of damage)

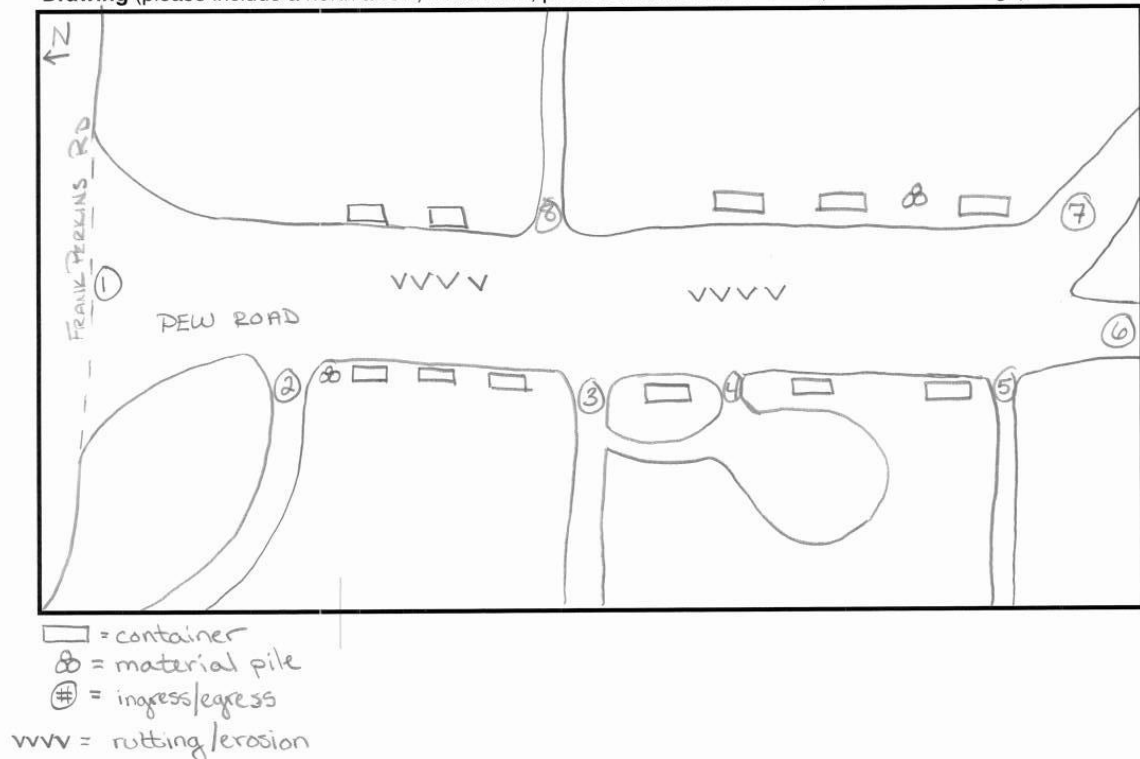




Figure 9. View facing south of SVL 4 depicting conex containers



Figure 2. Material pile between conex containers toward the southern end of SVL 4 on the east side



Figure 3. Material pile at the north end of SVL 4 to the west side of the roadway



Figure 4. View of rutting and erosion in the roadway of SVL 4



Figure 5. An example of tree scarring along the road edge of SVL 4

Massachusetts Military Reservation - Soldier Validation Lane Post Assessment of Container Locations

Site SVL6-A4(NBC) Assessors S. Paventy Date 9/17/2012

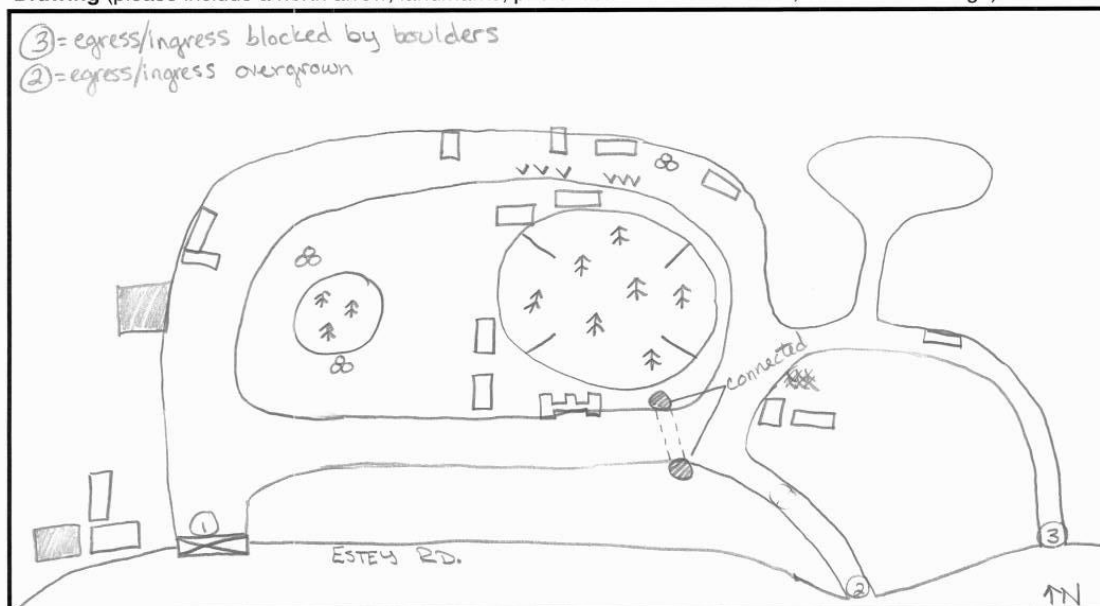
Damage	Description
☒ Tree scarring	<u>Ingress/Egress: 3 ; Fire-scarring trees</u>
☒ Standing deadwood	<u>Containers: 18 ; standing deadwood in forested areas</u>
☒ Felled trees	<u>Fallen dead tree</u>
☐ Brush piles	
☒ Erosion	<u>Erosion in pathway leading toward Estu Rd near culvert</u>
☒ Ditching/rutting	
☒ Trash	
☐ Spills	
☒ Material piles	<u>Pile of broken concrete next to island near gated entrance</u>
☒ Other	<u>2 concrete/gravel pads w/ cement walls; culvert; guard rail near culvert</u>

Percent Cover	Dominant Species
<u>30</u> Trees	<u>Pinus rigida, Quercus rubra, Quercus alba</u>
<u>10</u> Shrubs	<u>Vaccinium pallidum, Comptonia peregrina</u>
<u>50</u> Herbaceous	<u>Digitaria ischaemum, Festuca rubra</u>
<u>10</u> Bare	<u>Gravel, compact soil</u>

Any improvements made for training?

Additions (decks) added to containers

Drawing (please include a north arrow, landmarks, photo locations and direction, location of damage)



- = gate
- = ingress/egress
- = Guard Rail
- = culvert
- = container
- = veg. island
- = material pile
- = gravel/concrete pad
- = felled tree logs
- = mild rutting/erosion



Figure 1. View facing west of a gravel pad with concrete walls at SVL 6



Figure 2. View facing east of conex containers at SVL 6



Figure 3. View facing northwest of conex containers set up for market simulation at SVL 6



Figure 4. View facing north-northeast of conex containers at SVL 6



Figure 5. View facing east of a conex container on an eastern side road at SVL 6



Figure 6. View facing west of a grated culvert on the south side of the roadway at SVL 6. Note the guard rail northeast of the culvert.



Figure 7. View facing north of a grated culvert on the north side of the roadway at SVL 6.



Figure 8. View facing east of erosion in the roadway near the north edge of SVL 6.



Figure 9. View facing south of a representation of a fallen dead tree at SVL 6



Figure 10. View facing south of a representation of fire scarred trees at SVL 6



Figure 11. View facing south of ingress/egress at SVL 6



Figure 102. View facing north of a material pile near a vegetated island on the western side of SVL 6



Figure 13. View facing northeast of a material pile toward the east edge of SVL 6



Figure 14. View facing northeast of a material pile at the northeast corner of SVL 6

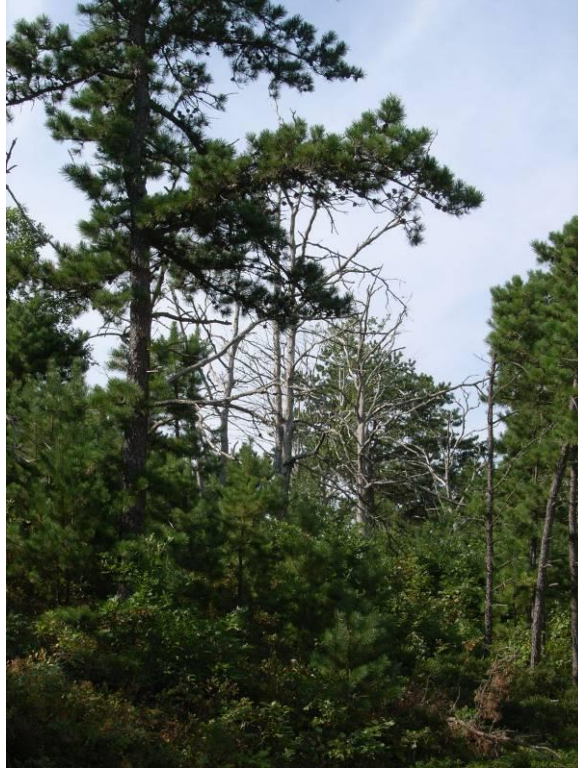


Figure 15. View facing southwest of standing dead trees at SVL 6



Figure 16. View facing west of a standing dead tree with recent tree scarring at SVL 6



Figure 17. Evidence of tree scarring at SVL 6

Massachusetts Military Reservation - Soldier Validation Lane Post Assessment of Container Locations

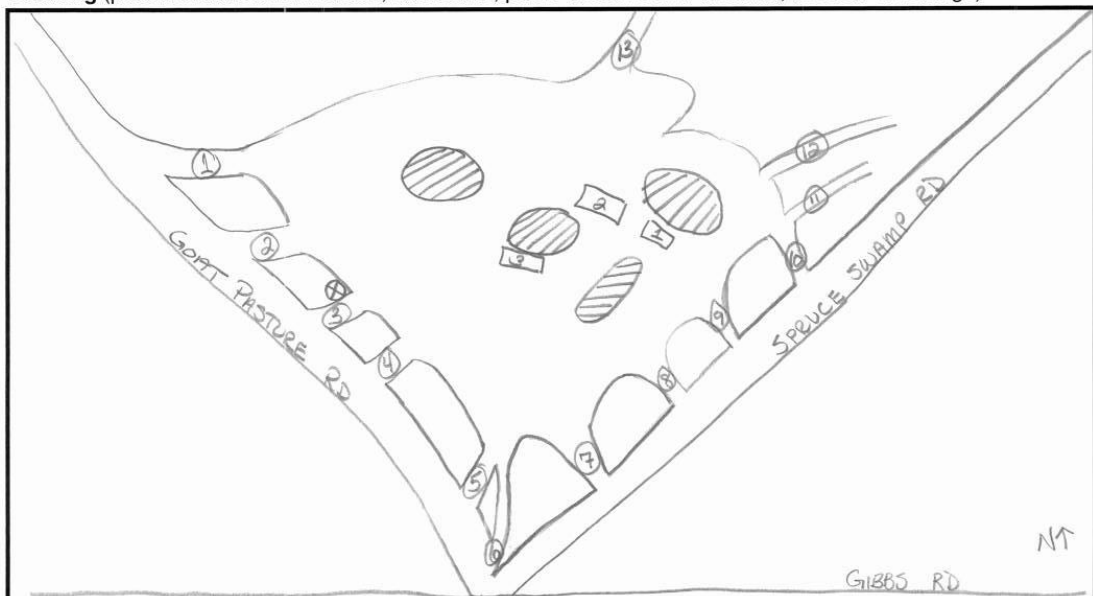
Site SVL 17 - DigSite 2 ^{C14} Assessors S. Paverly Date 9/17/2012

Damage	Description
☒ Tree scarring	<u>Ingress/Egress: 13 minimal tree scarring</u>
☐ Standing deadwood	<u>Containers: 3</u>
☐ Felled trees	
☐ Brush piles	
☒ Erosion	<u>Evidence of erosion/rutting but only mild</u>
☐ Ditching/rutting	
☒ Trash	
☐ Spills	
☐ Material piles	
☒ Other	<u>Deer Tracks</u>

Percent Cover	Dominant Species
<u>20</u> Trees	<u>Quercus alba, Quercus rubra</u>
<u>10</u> Shrubs	<u>Kalmia angustifolia, Myrica pensylvanica</u>
<u>75</u> Herbaceous	<u>Agrostis perennans</u>
<u>5</u> Bare	<u>compact soil</u>

Any improvements made for training?
Add 3 containers for village simulation.

Drawing (please include a north arrow, landmarks, photo locations and direction, location of damage)



- ☒ = ingress/egress
- ☒ = depression
- ☒ = container
- ☒ = veg. island



Figure 11. View facing north of a conex container at SVL 17



Figure 12. View facing east of conex containers at SVL 17



Figure 3. View facing west of an ingress/egress at SVL 17



Figure 4. View facing west of an ingress/egress at SVL 17. Note the slight tire rutting in the roadway.



Figure 5. View facing west of an ingress/egress at SVL 17. Note the slight tiring rutting along the roadway.



Figure 6. Evidence of tree scarring at SVL 17



Figure 7. View facing east of SVL 17



Figure 8. View facing north-northwest of SVL 17

Massachusetts Military Reservation - Soldier Validation Lane Post Assessment of Container Locations

Site SVL 21 Assessors S. Paventy Date 10/12/2012

Damage	Description
☐ Tree scarring	
☒ Standing deadwood	<u>low saplings</u>
☐ Felled trees	
☐ Brush piles	
☐ Erosion	
☒ Ditching/rutting	<u>minor - some in soil pile</u>
☐ Trash	
☐ Spills	
☒ Material piles	<u>dirt</u>
☒ Other	<u>CONTAINERS' TAIL (5) powerline adjacent ingress/egress: 3</u>

Percent Cover	Dominant Species
<u>5</u> Trees	<u>Pinus rigida</u>
<u>3</u> Shrubs	<u>Blueberry, Kalmia angustifolia, Sand oak</u>
<u>2</u> Herbaceous	<u>Knapweed, Festuca rubra</u>
<u>90</u> Bare	<u>Compact Soil, Sand</u>

Any improvements made for training?

containers added

Drawing (please include a north arrow, landmarks, photo locations and direction, location of damage)





Figure 13. View facing north of SVL 21

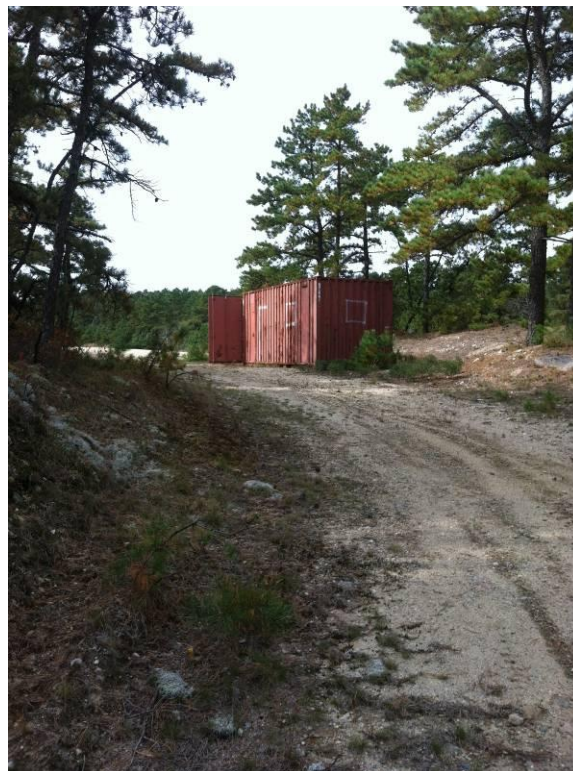


Figure 14. View facing south of a container at SVL 21



Figure 15. View of an ingress/egress facing west at SVL 21



Figure 16. View of an ingress/egress facing east at SVL 21



Figure 17. An overview of SVL 21 facing west



Figure 18. Evidence of a material pile with rutting at SVL 21